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POPULAR Computing WEEKLY

SPECIAL TAPE OFFER

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This Week

News Desk

A quantum leap from Sinclair

WELL, here it is The new Sinclair QL microcomputer

It is based on the 68000 16-bit processor with 128K Ram and twin microdrives as standard, all for a price of £399 Also supplied with each machine is a highly advanced suite of software spreadsheet, database word-processing and business graphics packages — over 300K of machine code software supplied on four micro cassettes each with an accompanying manual

The machine will not be software compatible with existing ZX Spectrum software and the QL runs a new version of Basic — the so-called SuperBasic

Up to 90K is addressable in SuperBasic which includes structured programming commands and support procedures Five user-definable function keys are provided SuperBasic has a keyword entry mode

The machine has a bit-mapped colour high-resolution screen — 32K of Ram is reserved for the display

The QL has a built-in multitasking facility with a new QDOS operating system and full networking enabling up to

Continued on page 5

Successors to the 64

COMMODORE has exhibited two new home computers — successors to the Commodore 64 machine — at the Consumer Electronics Show at Las Vegas

Both are based around the same, a new microprocessor chip — the 7501 — and consequently software for the new machines will not be compatible with that for either the Commodore 64 or the Vic20

The first new micro is to be called the Commodore 264 It has 32K Rom and 64K Ram of which 60K is addressable in Basic Maximum screen resolution is 320 × 200 pixels and the 264 has two sound generators each with eight

Continued on page 5

Continued on page 51

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We cannot guarantee to return every submitted article or program so please keep a copy. If you want to have your own program returned you must include a stamped addressed envelope.

Accuracy
Popular Computing Weekly cannot accept responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

This Week

Editorial

The Games Centre, which went into liquidation last week, will be missed by games players everywhere. Together with its great rival, the Games Workshop, it provided a treasure house of board games, role playing games, electronic and even computer games.

Graeme Levin founded the Games Centre 10 years ago with a little shop in Hanway Street, London. He built it up to the point where it numbered nine different shops and turnover exceeded £4m. So, where did it all go wrong?

Ironically, according to Graeme Levin, part of the problems were caused by buying a computer. Misled by its reports, the Games Centre rapidly became overstocked with games that didn't sell. As a result, the Games Centre ran into severe cash flow problems.

The Games Centre was built around the idea of providing a focal point for gamers, with a shop manned and run by games enthusiasts. Perhaps, as the Centre grew and the business side became more important, some of that enthusiasm waned.

Graeme Levin, however, is unlikely to disappear. He co-authored the game *Speculate* and helped to bring games such as *Survive* and *Conspiracy* on to the market. His knowledge of games and the games industry is too valuable to waste.

There is obviously a market for shops such as the Games Centre as Games Workshop and the Video Palace have proved. But, it remains to be seen whether anyone will set up shop on as large a scale as the Games Centre.

Next Thursday

Next week's star game is Draughts for 16/48K Spectrum by David Cox — try to move the red counters to one side and the blue counters to the other


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Commodore

Continued from page 1

volume levels, programmable as either two music channels or one music and one white noise channel. The full-size full-travel 67-key keyboard includes four pre-programmable function keys (giving up to eight user-defined keys when used together with the *Shift* key).

Software in the Commodore 264 Rom provides a full upper- and lower-case character set, built-in machine code monitor and 'window' graphics capability. Spreadsheet, word-processing, file-handling and graphics software is available either as a built-in option or as a range of plug-in cartridges. Using the 'windowing' facility, for example, both spreadsheet and word-processing information can be viewed simultaneously.

The price of the 264 has yet to be finalised but it is expected to sell in the US for under $500 (about £335). It is scheduled to go on sale in the States from April 1 this year and it is hoped that it will arrive in Britain in May or June.

Commodore's other machine is the Commodore V364. Very similar to the 264 this computer includes a built-in speech synthesizer with a vocabulary of over 250 words, accounting for its increased Rom size of 48K. Additional vocabulary can be soft-loaded from cartridge or disc. The V364 also features an 86-key keyboard including a 19-key numeric pad.

Sinclair QL

Continued from page 1

64 QL or Spectrum computers to be linked.

The Sinclair QL is 19 inches long and 5½ inches wide, with a full-size professional quality keyboard. It has tv and RGB monitor outputs and RS232C and twin joystick ports. Ram is capandable from 128K up to 640K. Although the 68000 chip is externally 16-bit, its internal architecture is 32-bit, making the QL considerably faster than an 8-bit chip such as the ZX80 (Spectrum) or 6502 (BBC and Commodore 64).

As is now traditional for new Sinclair products, the QL will be available initially only by mail-order.

Oric 2 makes its debut

ORIC will launch its new home computer — the Oric 2 — at the Which Computer? Show to be held at the NEC in Birmingham between January 17 to 20.

The machine will be very similar to the Oric 1 except it will feature a better keyboard.

The Oric 2 will have 48K Ram and be based on the 6502 8-bit processor. All Basic programs written for the Oric 1 will run without alteration on the new machine.

The price of the new machine is expected to be around £160.

Networking from Acorn

ACORN has announced a local area networking device for laboratory equipment.

The new IEEE Interface for the BBC computer is capable of addressing and controlling up to 14 devices – oscilloscopes, voltmeters, Spectrum analysers and other such equipment – compatible with the IEEE electrical standard.

*The interface unit plugs into the 1MHz bus on the BBC micro and software to drive it, adding some 27 new commands to BBC Basic, comes on a Rom which plugs into the sideways Rom-slot on the BBC machine. The interface is then addressed using the command *IEEE.*

Priced at £325, the IEEE Interface will find application mainly in research laboratories, colleges and schools.

Left out in the cold

PRISM is offering a new service for micro owners who feel their machines are left out in the cold after the manufacturer's guarantee has expired.

For £14.99 a year Prism will cover the cost of repairs to any micro which retails at under £250; for £24.99 the cover is extended to include any machine costing up to £500.

Details from Prism Micro Care, Wellington House, Ashford Road, Maidstone, Kent.

Murdoch bid for Warner

RUPERT Murdoch is still continuing with his plans to gain control of Warner Communications — of which the ailing Atari computer company is a division.

He has indicated his intention to increase his stake from 6.7 percent up to 49.9 percent. For such a move he will need to raise somewhere in the region of $900m.

Launched into orbit

SURREY University is to launch a new satellite into orbit in March.

This satellite, like the first (see *Popular Computing Weekly*, Vol 2 No 39) will be for use by amateur radio enthusiasts with computers who will be able to receive orbital data broadcast by the device as it circles the earth.

The satellite itself, standing about three feet tall, contains its own microcomputer built around the 1802 chip with 48K of Ram.

Roger Peal, software engineer on the £350,000 project, said: "The new device will have better computing and telemetry than the earlier one which only had 16K on-board." The satellite stores information about temperature and magnetic field strength as it orbits the earth from pole to pole, transmitting data recorded over a whole orbit in short bursts. The increased memory of the new satellite means that more information will be able to be collected and transmitted to radio amateurs.

The satellite will be launched in March from an American Delta rocket.

Games Centre stores go under

THE Games Centre chain of specialist games shops has gone into liquidation.

The nine stores were claimed by their founder Graham Levin to have the largest range of puzzles and games anywhere in the world. The shops also specialised in selling home computers, video games machines and associated games software.

Graham Levin, himself a keen games enthusiast, opened his first store in 1974. Last year the chain had a combined turnover of more than £4m.

The decision to put the Games Centre company into liquidation was blamed by Graham Levin on "bad cash flow problems". Since 1982 the company had been expanding very rapidly, opening seven of the nine stores in the last two years.

Colour monitors for micros

MICROVITEC has announced two new colour monitors — a 14-inch and a 20-inch, compatible with most home micros.

The models will operate in either of two modes, handling a standard PAL-encoded tv picture output with sound or taking an RGB monitor output from the computer.

The 14-inch is priced at £259 and the 20-inch costs £349. Details from Microvitec, Futures Way, Bolling Road, Bradford, W Yorks.

Puzzle it out

My office colleagues and I all own Spectrums and look forward every week to the puzzle in your magazine Indeed, we have a competition to see who gets the answer first and also the quickest time when the program is run

In an attempt to get the quickest time we came upon something your readers may be interested in — when raising anything to a power, it is much quicker and much more accurate to multiply numbers together than to use the power function ↑, ie B * B is better than B ↑ B

Type in the following programs and see the difference in time Using the ↑ function takes 13 times longer than multiplying together

Program 1

```
10 for n = 1 to 100
20 let z = n ↑ 2
30 next n
```

Runs in 13 secs

Program 2

```
10 for n = 1 to 100
20 for z = n * n
30 next n
```

Runs in 1 sec

Now insert line 25 *if z = 10000 then print z*. You will see that program 1 will not print anything, whereas program 2 will print 10000

David Senior
West Yorkshire

Violence and meyhem

Seeing my pal and patron Mel Croucher slagged in print the other week by a couple of your readers who seemed to think he was guilty of some hypocrisy for condemning aggressive games in the same magazine which carries a comic-strip style advertisement for his firm, Automata, depicting (nay, revelling in) scenes of torture, deceit, violence, etc, I feel bound, as the artist, to spring to his defence here

It is assumed that Mel actually writes the scripts for these diversions This is partly true He passes these scripts to me I take them to my studio, read them and throw them away Then I write something entirely different, spiced with much jolly violence and mayhem

I present the artwork to Automata on the last possible day, in fact at the very last possible minute, leaving no time for corrections or amendments Heh heh I don't know how I've got away with it for so long I have a feeling that there's a plot going on, so if I "disappear" soon, you'll know who to point at

I think that Mel, Christian, the PiMan and all at Automata

THE REAL CULPRIT

are pursuing a very laudable cause I don't know about James Hickman (15) of Northampton, but I'm glad somebody's into spreading joy and happiness across the planet but that doesn't mean to say they're gonna stop me! Oh, and to those of you who think the cartoons are irritating and childish, all I can say is, 'yah boo sucks rasp to you guys'!

Robin Grenville Evans
Hampshire

A sense of humour?

Enough of this high score nonsense on your letters page Let's get some real computing correspondence going I've had an idea

Clive sold 100,000 ZX80s For those who know not, a ZX80 is like a Spectrum, but two years earlier without colour, sound or graphics, without most of the Basic, without decimal points and without a keyboard (well, almost) So, where are they now?

For every 10 Spectrums in the world there is a ZX80 somewhere Are any still in use? Have you any theories as to their whereabouts? Most of all, did any of the *PCW* readers of today own a ZX80 in the days of the soldering iron?

Awaiting further correspondance I shall kick off My ZX80 was a Chrissy pressy in 1980 1K was small even then, so I bought a 16K Ram pack The 4K Rom could not be helped

It was the first computer under £100 and I was amazed at its great capabilities It was running a (laughable) invader game within three days Within three months I learnt machine code on it — then the ZX81 came out

My Ram pack was pressed into service on my (handbuilt) ZX81 and the ZX80 gathered dust for a whole year, until I met a Sharp MZ80K owner He had worked out that his 80K presently working on a Z80 cpu, could tolerate the extra speed of the Z80A So, my ZX80 got butchered and for a nominal £1 sold its heart to the Sharp The rest of the pcb went to an electronics freak who said he could make good use of the chips And that was that

Come on ZX80 owners Show yourselves

Mike Hampson (veteran)
7 Hereford Drive
Clitheroe
Lancs

ZX80 owners

I write in reply to L Hewelly re Deviant Ways, Letters, *PCW* Vol 3 No 1 First, the Losers cartoon is not simply there for the less able computer users as many people with quite formidable intellect and ability have a sense of humour unlike, it seems, L Hewelly

Regarding the field of educational software, this is still very much in its infancy with very few educationalists actively participating in programming To say that games writing is more educational than educational software writing is ludicrous, as educational software is closer in general structure and technique to real business software than games I have personal experience of young children using appalling structures due to taking short cuts and the trend for developing games at the keyboard

Whilst in the area of structured programming, I would like to advocate that some magazine space be designated for the more noble of the programming languages, specifically Pascal which BBC Basic tries so hard to emulate The inclusion of a Pascal column would be universally appreciated as Pascal, unlike Basic, is extremely portable and many of the more popular micros now support this language

When L Hewelly refers to the Spectrum as a "hideous little plug socket" he shows very little of the intellect he exhibits elsewhere in his use of English grammar All micros have their strong and weak points The Spectrum is an idea first computer with its excellent manual and low initial cost The BBC makes an exellent second micro due to its expansion possibilities, complexity and many superior features Thus the role of the Spectrum more than warrants the amounts of simpler literature printed for it, not forgetting however that many extremely experienced users do in fact own Spectrums

The comments about Automata are, in my view, uncalled for as Automata make a worthwhile contribution to *PCW* in providing some very good light entertainment

Finally, (no quips please), high score tables There is a large amount of interest shown in these so surely (remember democracy?) it must be the duty of *PCW* to provide for its readers if suitable means and safeguards can be found

I join L Hewelly in wishing everyone a happy new year

D J Parrot
61 Warrington Road
Dagenham
Essex

A Pascal column is an interesting idea, but perhaps a general language column would be of more widespread use

'Ah well! It was fun while it lasted!'

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CVG2

Noughts and Crosses

A new game for 16K or 48K Spectrum by Barry Ashfield



In this version of Noughts and Crosses you are given the option of playing against the computer (Clive) or you can select the two player mode and play another person. In the two player game the player who inputs the first name will have the first go and will be nought. In following games the first go alternates between players, scores are kept and displayed on the right of the screen. To make a move just select the number of the square and press enter.

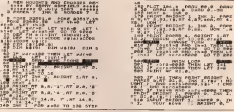
Playing against the computer you have a choice of levels (hard or very hard) and you are given the first go with nought. If you should defeat the computer the learning routine is brought into action and you will have to try another trick next time!

The learning routine works by storing the sequence of moves in g$. If the game results in a defeat or a draw (Clive's first turn only) the contents of g$ are transferred to c$ and remembered. If the same sequence is encountered in a later game a different move is made so the longer you play the harder it becomes to win.

It is possible to keep this information by Saving "oxo" LINE 40. On reloading the game will continue where you left off. 16K users should delete all REM statements. It is possible on 48K machines to make c$ larger, but note that Line 42 (wdr) will need alteration as well.

Notes

1/200	Draws Screen and sets up variables
200 220	Alternates turn
500 570	Input move and DATA for printing X or O
1000-1110	Check for win or draw
2000-4030	Computers move
5000-5050	Draw NOUGHT/CROSS
6100-6430	Draw win lines
7000 7250	Score/next game
9000-9200	Start game choose level
FNm() generates random move	
FNu () checks for best move	
won	players score
lost	Clive's score
drawn	number of draws
c$	stores winning moves
b$	checks for new move
g$	stores current moves
u$	check win/draw/lose
f$	first player's name
s$	second player's name
vh	game level
two	1 or 2 players
ch	change turn
wdr	value of c$
xoro	nought or cross
m$	input move
m	computers move

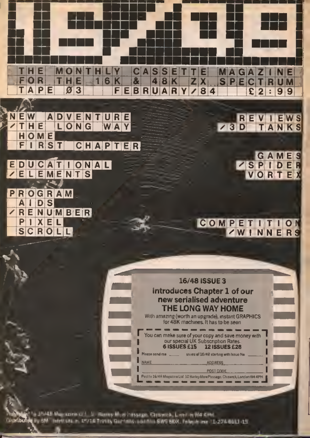


```
  1 REM NOUGHTS AND CROSSES REM
   **** BY BARRY ASHFIELD *****
   ******** © July 1983 ******
  3 PAPER 7: INK 0: BORDER 7: C
LS
  5 POKE 23561,0: POKE 23617,1
  4 POKE 23609,50: LET vh=0: LET
two=0: LET ch=3
 10 LET wdr=0: LET won=0: LET l
ost=0: LET drawn=0: GO TO 9000
 15 DEF FN m()=INT (RND*9)+1
 20 DEF FN u()=CODE u$(a)+CODE
u$(b)+CODE u$(c)
 30 DIM c$(100,9)
 40 DIM b$(9): DIM u$(9): DIM g
$(9)
 42 IF wdr=100 THEN LET wdr=0
 45 CLS : LET count=0
 50        DRAW GAME FRAME
 60 LET a$="
 70 PRINT INK 7; BRIGHT 1;AT 5,
0;a$;AT 11,0;a$
 80 FOR a=0 TO 16
 90 PRINT INK 7; BRIGHT 1;AT a,
5; ;AT a,11;
100 NEXT a
110 PRINT AT 0,0;"1";AT 0,6;"2";
AT 0,14;"3"
120 PRINT AT 6,2;"4";AT 6,6;"5"
;AT 6,14;"6"
130 PRINT AT 14,2;"7";AT 14,8;"
8";AT 14,14;"9"
140 INK 1: FOR a=62 TO 132 STEP
40
150 PLOT 184,a: DRAW 60,0: DRAW
0,32: DRAW -60,0: DRAW 0,-32
160 NEXT a: INK 0
170 PRINT BRIGHT 1; INK 1; PAPE
R 9;AT 2,21;f$;AT 4,27;won;AT 4,
22;"WON"
180 PRINT BRIGHT 1; INK 2; PAPE
R 9;AT 7,21;s$;AT 9,22;"WON";A
T 9,27;lost
190 PRINT PAPER 4; BRIGHT 1;AT
13,22;"DRAWN";AT 13,28;drawn
200       CHANGE TURN
210 IF count=0 AND ch=1 THEN LE
T ch=0: LET xoro=8000: GO TO 500
220 IF count=0 AND ch=0 THEN LE
T ch=1: LET xoro=5000: GO TO 200
0
500       MAIN LOOP
501 IF xoro=8000 THEN LET I=1
502 IF xoro=5000 THEN LET I=2
505 PRINT AT 21,0;

509 IF two THEN PRINT BRIGHT 1;
PAPER 9;AT 21,0; INK I;f$+" ( NO
UGHT )" AND xoro=8000,s$+" ( CRO
SS )" AND xoro=5000
508 IF two=0 AND xoro=8000 THEN
PRINT BRIGHT 1; PAPER 9; INK I;
AT 21,0;f$;" ( NOUGHT )"
510 INPUT BRIGHT 1; PAPER 9; IN
K I;"   YOUr move  "; BRIGHT 0;"
```



```
', LINE m$  IF CODE m$<49 OR CODE m$>57 OR LEN m$>1 THEN GO TO 510
 511 IF u$(VAL m$)<> " " THEN GO TO 510
 513 IF two AND xoro=5000 THEN GO TO 521
 514 LET g$(count+1)=CHR$ (64+VAL m$)  LET u$(VAL m$)="0"
 515 GO TO 530
 520 LET I=2  LET m$=STR$ m
 521 LET g$(count+1)=CHR$ (90+VAL m$)  LET u$(VAL m$)="1"
 530 RESTORE 530  DATA 5,141,20,150,2,2,53,141,60,160,2,6,100,141,110,150,9,14
 531 DATA 5,93,20,105,5,2,53,93,60,100,5,6,102,93,110,100,5,14
 532 DATA 5,45,20,60,14,2,53,45,60,60,14,6,102,45,110,60,14,14
 540 FOR n=1 TO VAL m$
 550 READ x,y,p,q,x1,y1
 560 NEXT n
 570 PRINT AT x1,y1;" "  GO SUB xoro
1000 REM     CHECK FOR WIN
1010 RESTORE 1010  DATA 1,2,3,20,4,5,6,0,0,7,8,9,14,0,1,4,7,2,100,2,5,8,6,100,3,6,9,14,100,7,6,3,6,300,1,5,9,0,300
1020 FOR f=1 TO 8
1030 READ a,b,c,d,line
1040 IF u$(a)<>" " AND u$(a)=u$(b) AND u$(a)=u$(c) THEN GO TO 6100+line
1050 NEXT f
1060 LET count=count+1
1070 IF count=9 THEN LET drawn=drawn+1  PRINT BRIGHT 1; PAPER 6;AT 13,28;drawn
1075 IF two=0 AND count=9 AND xoro=5000 THEN LET wdr=wdr+1  LET c$(wdr)=g$
1080 IF count=9 THEN PRINT FLASH 1; BRIGHT 1; PAPER 0; INK 1;AT 19,3;" DRAWN GAME ",; FLASH 0;AT 21,0;"PRESS ENTER TO TRY AGAIN"  PAUSE 0  CLS  GO TO 40
1100 IF xoro=5000 THEN GO TO 2000
1110 IF xoro=6000 THEN GO TO 500
2000 REM     COMPUTERS TURN
2010 IF two THEN GO TO 500
2020 LET inc=3100
2030 PRINT FLASH 1; BRIGHT 1; PAPER 0; INK 2;AT 21,0;"   clive is thinking"
2040 IF u$="         " THEN LET s=FN s()  GO TO 520
2050 LET ret=1  GO TO 2500
2100 REM     COMPUTER LEARNS
2105 IF count=0 THEN GO TO 2500
2106 IF wdr=0 THEN GO TO 2280
2107 LET a$=""
2110 FOR U=1 TO wdr
2120 LET z=count
2130 IF g$( TO z)<>c$(U, TO z) THEN NEXT U
2140 IF g$( TO z)=c$(U, TO z) THEN LET a$=a$+c$(U,z+1)
2150 NEXT U
2160 IF count>1 AND LEN a$=0 THEN GO TO 2500
2170 FOR F=1 TO LEN a$
2180 FOR s=1 TO 9
2190 IF a$(F)=CHR$ (96+s) THEN LET b$(s)=CHR$ 140+s)
2200 NEXT s
2210 NEXT F
2220 LET L=0  FOR F=1 TO 9
2230 IF CODE b$(F)=32 THEN LET L=L+1
2240 NEXT F
2250 IF L=1 THEN DIM b$(9)
2260 IF count>1 OR vh=0 THEN GO TO 2280
2265 LET s=FN s() AND u$(5)="0"  IF s=1 OR s=3 OR s=7 OR s=9 THEN GO TO 2290
2268 IF u$(5)="0" THEN GO TO 2265
2270 IF vh AND u$(5)=" " THEN LET s=5
2275 GO TO 520
2280 LET s=FN s()
2290 IF CODE b$(s)<>32 OR u$(s)<>" " THEN GO TO 2280
2300 GO TO 520
2500 RESTORE 2550
2510 FOR n=1 TO 8  READ a,b,c
2520 GO SUB inc
2530 NEXT n
2540 LET inc=inc+100
2545 IF inc=3300 AND ret=1 THEN LET ret=0  GO TO 2100
2550 DATA 1,2,3,4,5,6,7,8,9,1,4,7,2,5,8,3,6,9,1,5,9,3,5,7
2560 GO TO 2500
3100 REM     CHECK X X -
3110 IF FN u()=130 THEN GO TO 4000
3125 RETURN
3200 REM     CHECK 0 0 -
3210 IF FN u()=130 THEN GO TO 4000
3240 RETURN
3300 REM     CHECK X - -
3310 IF FN u()=113 THEN GO TO 4000
3340 RETURN
3400 REM     CHECK 0 - -
3410 IF FN u()=112 THEN GO TO 4000
3430 RETURN
3500 REM     CHECK X - 0
3510 IF FN u()=129 THEN GO TO 4000
3540 RETURN
4000 REM     RANDOM NUMBER
4010 LET s=FN s()  IF u$(s)<>" " THEN GO TO 4010
4020 IF s=a OR s=b OR s=c THEN GO TO 520
4030 GO TO 4000
5000 REM       DRAW CROSS
5005 INK 2
5010 PLOT x,y  DRAW 30,30
5020 PLOT x,y+1  DRAW 30,30
5030 PLOT x,y-1  DRAW 30,30
5040 PLOT x,y+30  DRAW 30,-30
5050 PLOT x,y+31  DRAW 30,-30
5060 PLOT x,y+29  DRAW 30,-30
5065 BEEP .1,15
5070 INK 0
5095 LET xoro=6000
5100 RETURN
6000 REM       DRAW NOUGHT
6010 FOR a=14 TO 15
6020 CIRCLE INK 5;p,q,a  CIRCLE INK 5;p+1,q,a
6030 NEXT a
6035 BEEP .1,0
6040 LET xoro=5000
6050 RETURN
6100 REM DRAW WINNING LINES
6105 REM    1-2-3 4-5-6 7-8-9
6110 FOR f=0 TO 16  PRINT FLASH 1; INK 5; PAPER 2;AT d,f;"■"
6120 BEEP .05,f*2  NEXT f
6130 GO TO 7000
6200 REM    1-4-7 2-5-8 3-6-9
6210 FOR f=0 TO 16  PRINT FLASH 1; INK 5; PAPER 2;AT f,d;"■"
6220 BEEP .05,f*2  NEXT f
6230 GO TO 7000
6300 REM         7-5-3
6310 FOR f=15 TO 0 STEP -1
6320 PRINT FLASH 1; INK 5; PAPER 2;AT f,d;"■"  BEEP .05,f*2
6325 LET d=d+1
6330 NEXT f
6340 GO TO 7000
6400 REM         1-5-9
6410 FOR f=0 TO 16  PRINT FLASH 1; INK 5; PAPER 2;AT f,f;"■"
6420 BEEP .05,f  NEXT f
6430 GO TO 7000
7000 REM NEXT GAME / SCORE
7010 PRINT BRIGHT 1; INK 1; PAPER 9;AT 21,20;"WON THE GAME"
7020 IF two=0 AND xoro=6000 THEN PRINT AT 21,0; INK 1; BRIGHT 1; PAPER 9;"    Clive"
7100 IF xoro=6000 THEN LET won=won+1  PRINT BRIGHT 1; INK 1; PAPER 9;AT 4,27;won
7150 IF xoro=5000 THEN LET lost=lost+1  PRINT BRIGHT 1; INK 8; PAPER 9;AT 8,27;lost
7155 IF two=0 AND xoro=5000 THEN LET wdr=wdr+1  LET c$(wdr)=g$
7250 PRINT #0; BRIGHT 1; INK 1; PAPER 9;"PRESS ENTER TO PLAY AGAIN"  PAUSE 0  CLS  GO TO 40
9000 PRINT AT 3,6;"NOUGHTS AND CROSSES"
9010 PRINT AT 7,0;"  PRESS c TO PLAY THE COMPUTER"
9020 PRINT AT 11,0;"    PRESS t FOR TWO PLAYERS"
9030 POKE 23658,0
9050 IF INKEY$="c" THEN GO TO 9150
9055 IF INKEY$="t" THEN GO TO 9100
9060 GO TO 9050
9100 LET ch=1  LET two=1  CLS
9110 PRINT AT 3,5;"NOUGHT WILL GO FIRST"
9120 INPUT "First players name         (up to 10 letters)",f$
9125 IF LEN f$>10 THEN GO TO 9120
9130 INPUT "Second players name         (up to 10 letters)",s$
9135 IF LEN s$>10 THEN GO TO 9130
9140 GO TO 40
9150 INPUT "Your name please         (up to 10 letters)",f$
9155 IF LEN f$>10 THEN GO TO 9150
9160 CLS  PRINT AT 8,0;f$;AT 8,11;"WILL GO FIRST";AT 10,12;"WITH NOUGHT"
9170 PRINT AT 15,0;"PRESS  h  for HARD";AT 17,0;"PRESS  v  for VERY HARD"
9180 PAUSE 0
9190 POKE 23658,0  IF INKEY$="v" THEN LET vh=1
9200 LET s$="clive"  LET ch=1  GO TO 20
```


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Pickled eyes for tea

David Kelly talks to micro artist Stuart Hughes

To a science fiction illustrator, the home microcomputer boom is a dream come true.

The whole industry is absorbed with aliens, far-away galaxies and improbable androids. For those who make a living out of painting cassette inserts and book jackets, computers are a licence to be paid for having fun.

Surprisingly though, there are few artists who successfully make a living out of micros. Internationally known sci-fi artists like Jim Burns and Tony Roberts are out of the league of all but the very biggest software companies.

The top micro artists can almost be listed on the fingers of one hand — David John Rowe who does work for Quicksilva and Interface, Steve Blower with Imagine, Melvin Bagshaw, Ian Craig and Stuart Hughes.

Stuart has done paintings for both software houses — Sinclair, Artic, Softek, — and computer book publishers — Addison-Wesley, Granada and Sunshine.

Being a commercial artist is a job just like any other — and Stuart has to work pretty hard. He may do seven or 10 paintings a month. The companies he works for he calls 'clients', they tell him what they want and he produces the goods often to quite tight deadlines. If pushed, he can turn round a finished painting in three days.

He reckons that painting is a craft to be learned like any other. "There is this myth that people are born gifted — either you can draw or can't draw. It's not true. If you want to do something and you work at it you'll do it." The first day Stuart was at art college, in his home town Liverpool, set the tone for him. "The guy said take something out of your pocket and draw it. The only thing I had was a paper tissue.

"I drew that one tissue over and over for eight hours. If you spend that amount of time drawing and painting you get better at it."

After one year's foundation course Stuart then did a three-year degree course at Norwich. "After Liverpool, Norwich was a culture-shock. A friend of mine used to walk down the street swearing at people just to try to get a reaction — Norwich is very nice."

The course wasn't to Stuart's liking either. "I was spending six weeks designing the title page of a book — I couldn't cope with that. After a year I just got on with painting and drawing.

"The course was not so much to do with what you could produce, but how you could talk about it. When you do a painting people either like it or they don't — you shouldn't have to talk about it."

After Norwich, Stuart did teacher-training and then taught for a year in a junior school in Liverpool. He realised that he missed drawing and painting very much — he gave up, moved down to London and after a couple of months, started getting some work, mostly from girls comics.

He also started selling some of his slightly macabre surreal paintings — jars of pickled eggs with eyes, pig-shaped sausages on a plate.

"I always used to read science-fiction books but not to do sf art — my stuff was more strange, slightly surreal fantasy. I sort of fell into it by doing the early covers of *Popular Computing Weekly* which Ian Craig and I shared between us."

Stuart paints on boards about A3 size, using an airbrush to create an almost photo-like realism. An airbrush uses a compressor to produce a fine controllable spray of paint. With the compressor going, painting is a noisy business and he has to wear a mask to prevent inhalation of the air-borne paint spray. "The airbush is just like a can of spray paint, except you have far greater control over the size and pressure of the air-jet.

"My aim is to be able to paint absolutely anything I can think up in such a way as to make it believable — you can believe there is a giant eye floating in the sky with a waterfall pouring out of it."

A new commission begins with the software company ringing up with the title of the game. Very occassionally, Stuart will see a pre-production version of the game — he has a 48K Spectrum and is a keen micro-enthusiast. "Then I just get on with other paintings — all the time thinking about the new game. Two ideas people help — friends Laura and Val."

The idea for Artic's *Inca Curse* came to Stuart in the pub. "It depends what I'm into at the time. When *Inca Curse* came along I was into skulls and bones."

The next stage is a rough pencil sketch and collecting references. Stuart draws mainly from photographs and has a filing cabinet stuffed with pictures of every conceivable object. When painting a face, he will often take a photograph of a friend which he then prints up himself to work from.

After the client has seen the rough sketch and given the go-ahead, the painting is started. Using the airbrush Stuart first puts down the background, masking off the main subjects — the skull in *Inca Curse*, for example — with acetate sheets.

Most of the rest of the painting is also airbrushed, with only the fine detail drawn with an ordinary paintbrush. Sometimes the details of faces are finished with oil paint, but that can take up to 10 days to dry. In many cases the liquitex acrylic paint of the airbrush is used througnout.

Stuart charges between £200 and £400 for a cassette cover, depending on the quality of work and time taken to do it. At present, Stuart rarely has time to spent more than four or five days on a painting. "It's hard work — prior to working for the micro industry I'd always spend more than two weeks on a picture, I've had to train myself to work faster."

In his spare time, Stuart is a keen runner. Until a knee injury cut short his running career at 17, he was the second fastest runner in the country for his age. He still runs when he finds time and he has taken up teaching again, one day a week at the local junior school. "I just paint, sleep, run and paint some more, with an occasional glass of beer.

"When I have a spare moment I play with the Spectrum. I'd like to be able to produce a computer version of a painting which could then be used on the screen as the game was loading."

Yet two years ago, Stuart didn't know home micros existed. "I couldn't believe my luck when I was first asked to do sf paintings. I'm really enjoying myself — I just keep waiting for the bubble to burst.

"It's just me painting what I want to with nobody turning round at the end and saying 'You've got to put a moon in the sky' or add something else in. Those are the kind of hassles you get in more stable fields like children's books.

"I can see computer artwork becoming more like that — more stodgy — as the companies mature. Some of them have already got art directors. Even now some houses are beginning to concentrate on what they reckon will sell the product, rather than producing an image that is interesting or different.

"In the end they will lose out — just like anybody else, I work better if I feel involved. The aim is to end up with something both of us — me and the software house — are proud of.

"The great thing about computers is you can paint just what you want. I could paint flowers — neon flowers — and I'm sure I could sell it." ■

Echoes of a distant past

***Andy Wilson** sees in the new year with a round-up of ZX81 software*

When Clive Sinclair launched the ZX81 on an unsuspecting public, I wonder if he realised he was inadvertently creating a whole new industry?

Soon after the ZXs appearance, software houses started popping up everywhere. Previously, although it had been possible to obtain games on cassette for the Pet, ZX80 and TRS80, the market had been very small.

Reading the *Street Life* column in *PCW*, one soon becomes aware of how many companies started life writing games for the ZX81. Nowadays, though, hi-res graphics, colour and sound are all the vogue — and the trusty old ZX81 is looking somewhat neglected. Although it is still selling steadily, very few companies are producing new software for the ZX81. If however you have just splashed out on a *Starter Pack* and are becoming bored with *Backgammon*, there are still quite a lot of games on the market.

One great challenge for programmers was writing games for the unexpanded 1K ZX81. With a full display file there are only 100 or so bytes to play with, so most attempts have been rather unsuccessful.

Micromega have tried to tempt the 1K ZX owner with their *Challenge* gamepack. The first thing one notices is that *Challenge* comes packed in a large box containing a large single-sheet instruction booklet and a small cassette. Delving around in the box for the cassette, we find it contains five machine code games. One of these, *Cartoon-man*, cannot really be called a game as it just consists of a nicely animated figure who can be walked across the screen at varying speeds. It held my attention for about a minute.

The little man appears again in *Juggler*. This time, his on-screen wanderings have a purpose. If you are quick with the keys and manage to stay awake, you will find yourself juggling with *As* and *Us*. If you drop three the game is over. You may choose to play again but this is unlikely.

Two of the games test your skills as a budding James Hunt. In *Brands Hatch* you are treated to a map of the famous race-course which you have to try to negotiate in record time. I spent most of my time spinning round in ever decreasing circles and disappearing up my own expansion port.

Road Race features an accurate map of the British Isles, with two roads between London and Scotland. According to the blurb, you can race your left hand against your right hand or challenge a friend. Alternatively, you could load the next game.

Meteor Strike is the only game on the tape that held my attention for more than a couple of minutes. Someone at Micromega is obviously a cartographer because the game is based on an extremely good map of the world. This can be scrolled from side to side, in order to make the meteors falling from the top of the screen land in the sea. As this is almost impossible, I found it much more interesting to see which countries I could destroy first.

To start a new game with a new map you have to reload the whole game. This is a pain because, as with all the games on this tape, the ZX81 has to be switched off then on again. All in all, nice maps — shame about the games.

When you have made the inevitable upgrade to 16K, you could try buying *Galaxians* from Quicksilva. In this stripped down copy of the arcade original you are attacked by swooping *Vs* and *Ws* which you fire at with an *A*. Surprisingly, the graphics are quite effective. The movement is fast and smooth, and you can get very involved in the game.

Wobbly birds and exploding egga

Unfortunately, your base neither moves nor fires fast enough in compenson to your attackers to make it possible to defend yourself properly. I only managed to clear the first screen a few times, and that was with the easiest possible combination of options. You have a choice of speed, rate of fire and the number of swooping *Galaxians*.

The demo mode is more fun to watch than usual as the game is different every time. If you manage to shoot a few *Galaxians* before you bite the dust, you can enter your initials on the lengthy hi-score table.

The most surprising thing about this game is the inlay blurb. You thought you were firing a laser cannon at alien spacecraft? Not in this game you're not! Your attackers are large wobbly birds dropping exploding eggs and your only defence is a dragon gut catapult.

The tape is also supposed to contain a second game, *Gloops*. As my review copy is devoid of anything remotely *Gloop*-like I do not feel in a position to comment. As for *Galaxians*, I loved the inlay blurb and the game wasn't bad either.

New releases for the ZX81 are rare nowadays so *Door Slammer* from Cathedral Software is very welcome. On loading, you are presented with a nice flashing picture of, guess what — a cathedral, followed by optional instructions which run over five screens. The object of the game is to close all the cathedral doors by walking through them, stripped down it's a bit like the old 'can you join the dots with x lines without taking pen from paper' type puzzle.

Added difficulty is provided by a ghost and a trapdoor. The ghost is totally invisible, and you don't know he's there until he slams you in the door, killing you instantly. It is well worth wandering round in the hope of being slammed, as you are treated

with a great picture of a smirking ghost crushing you twixt door and frame. If you manage to lock yourself in a room, you may be able to escape through the trap-



door, whereupon you reappear at random in another room. As the game is written in Basic it is rather slow, but as it is supposed to be a game of strategy rather than reactions, this doesn't matter too much.

A big fault in the programming is the hi-score table. As it uses the *Inkey$* routine for entering names, you have to use full stops instead of spaces. Although the game as a whole is a nice idea, after several plays I came to the conclusion that it is impossible, and started getting bored.

As an added bonus, the tape contains a machine code routine for inverting the screen which can be used in your own programs. As this routine is only a few bytes long and has appeared in practically every micro magazine and book, its usefulness as a bonus seems limited. Nice thought though.

Another relatively recent release is *Astral Convoy* from Vortex, another game where the aliens have more in common with H G Wells' martians than with good old cuddly ET. In this universe their evil little minds are intent on destroying a defenceless convoy. Defenceless, that is, apart from you, the gallant pilot of a well armed small white square.

Your mission is to blast those nasty, and probably slimy, aliens back to meet their creator. They try to hinder your task by depositing nasty spiked space mines. Hit one and it's your turn to chat with St Peter.

The keyboard layout takes some getting used to — the services of a good surgeon to rearrange the layout of your fingers might well make things easier. Most of my criticisms of this game might well stem from the fact that I wasn't very good at it. If alien zapping is your forté, you will probably enjoy it.

Maze Death Race from PSS is the only arcade game in this review that I keep returning to. It reminds me of *Rocket Chase*, a predecessor to *Pacman* in which you were chased round a maze by homing missiles while you tried to run over, or eat, all of the dots. In *MDR* you are driving a racing car pursued by baddies in other cars who smash into you in a suicidal fashion. The maze is nine times the size of the screen and scrolls in four directions.

Fast, smooth and tense . . .

You have to try to run over 10 asterisks on each screen, and every time you complete a screen an extra chase car appears to make life more difficult. Fast, smooth and tense, I found it a joy to play. My only criticisms concern the almost total lack of instructions and the fact that it has to be loaded in two parts.

In general, not being very good at most arcade games I tend to prefer adventures. One of the earliest releases for the ZX81, and still featuring in the top 10 charts, was Psion's *Fantasy Games*.

There are two games on the tape. The first, *Perilous Swamp*, is really an introduction to the more advanced *Sorcerers Island*. In *Swamp* you wander round fighting monsters and trying to rescue a princess. The fights are arranged on a points basis and are rather unpredictable. The commands you can enter are very simple, either a compass direction or a decision to fight, run or bribe.



Island is much more challenging. You still fight monsters using your strength points and the commands are still very simple. Your aim is to escape from the island with the aid of various spells, medals and keys you find on your journey. A map of the island is available on request and you are kept informed of your immediate surroundings. The map is drawn in *Fast* mode, but seems to take forever.

Monsters range from mice, which invariably run away, to dragons, which don't, with other strange creatures popping up everywhere. Can anyone tell me what a Bunyip is? Although I prefer more traditional adventures, *Fantasy Games* is an ideal introduction to adventuring.

The last game in this review is *Ocean Trader* from Quicksilva. More of a simulation than an adventure, you play the part of a mercenary mariner, trading between five British ports. You paid for your ship with a loan from the finance company, who you will certainly have to visit again for capital. True to life, they charge exorbitant interest rates and, if you owe them too much, they will repossess your ship.

You select your cargo from goods on offer at the port and then set sail. Seagoing hazards include pirates, fog and storms, losing your cargo being the most common outcome of encountering any of these. If you reach the next port with cargo intact, you can choose to sell or buy.

The instructions are very lengthy and are loaded separately — if you have a printer I advise you to list them. I played this game for hours and would recommend it to any budding capitalist.

There is still a lot of good software available for the ZX81, but watch out, there is a lot of rubbish as well. Highly recommended games not included in this review include Psion's *Flight Simulation*, Artic's adventures and, of course, the offerings from New Generation. Finally, a plea to all of the software houses: there are still a lot of us ZX81 owners out here, please don't forget us. ■

Firm	Program	Value (1-10)
Vortex Software 280 Brooklands Road Manchester M23 9HD	*Astral Convoy*	8
PSS 452 Stoney Stanton Road Coventry CV6 5DG	*Maze Death Race*	9
Cathedral Software The Lodge Brandon Lane Brandon Durham DH7 8SJ	*Door Slammer*	6
Micromega 230-236 Lavender Hill London SW11 1LE	*Challenge*	2
Psion/Sinclair Stanhope Road Camberley Surrey GU15 3PS	*Fantasy Games*	8
Quicksilva Palmerston Park House 13 Palmerston Road Southampton SO1 1LL	*Ocean Trader* *Galaxians and Gloops*	8 7



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A change of key

***Trevor Toms** moves on to the keyboard in the last of the series on machine code*

Now we move on to the keyboard. If you've been following these articles religiously, you'll be well aware that I've used a ROM routine (which I call *Awaits-key*) at address 15D4h to obtain keyboard input. This routine is reasonable, but it suffers from one or two drawbacks.

First of all, it actually suspends operation of your program until a key is pressed. This is probably undesirable since what I suspect most programs require is a sort of *Inkey$* facility whereby a zero reply is given if no key is being pressed. Secondly it's too slow since it uses the system variables *Repper* and *Repdel* to control repeat key actions. You can alter the value of these variables but it doesn't get away from the fact that machine coded programs are normally intended for speed.

Listing 1 shows a subroutine which simulates the *Inkey$* function exactly. On returning, register L contains the code of any key being pressed, or zero if no key. Register H as usual contains zero allowing you to maintain a degree of consistency in your work. In practice, the direct Basic equivalent of this subroutine is "*Code Inkey$*" since it gives the code value rather than a physical string.

This routine is fast although not as fast as direct keyboard scanning. If you want the fastest action your best course is to use "*IN*" commands along the lines suggested in chapter 23 of the Spectrum handbook, since in most cases programs requiring this degree of speed will be arcade-style games. As an example, if you want to detect any of the keys B to *Space* on the bottom row you would write

```
LD    BC,32766       ;scan bottom right B-SPACE
IN    A,(C           ;obtain key data
AND   1Fh            ;isolate keyboard data only
CP    1Fh            ;test for a key press
JP    NZ,keypress    ;jump if a key is being pressed
                     otherwise continue
```

If you are interested in one particular key, say the "N" key, you could rewrite the above routine to mask the single bit corresponding to that key. The five keys are represented by the five least significant bits of the returned data, and a zero value in any position indicates that the key is being pressed. So to detect "N" you would write

```
LD    BC 32766       ;scan B-SPACE keys
IN    A,(C)          ;obtain half row data
AND   8h             ;isolate 'N' key status bit 3
JR    Z,NPRESSED     ;jump if key is being pressed
```

This method has the distinct advantage that multiple key pressing can take place and the program will be able to detect them all. Against this, the disadvantage is that you cannot easily and quickly discover the "code" value of the key without some lengthy conversion coding. The *Inkey$* routine in Listing 1 cannot detect multiple key pressing, although it will continue to recognise the latest pressed key, so you must choose the best method of detection according to your own needs.

Listing 2 gives a full *Input* simulation for you to include. It places all received data into the area addressed by the system variable *Eline*, and places a carriage return (hex 0D) character at the end of the string. If you want a prompt to appear in front of the cursor, you should send your string to stream 1 before entering the routine. On return, register pair HL contain the address of the first character of the entered data. The routine sets flags as if *Line* data is to be entered, and so if SHIFT/6 is pressed, the subroutine sets HL to zero on exit. In this way your program can detect any "break" attempt.

In any case, this routine does not clear the bottom two lines prior to accepting data — your program must do that first (this allows you to display a prompt) by calling a ROM routine at address 0D6Eh which I'll refer to as *XCLslow*. Your complete input routine would therefore look something like

```
XCLSLOW  EQU  0D6Eh
XCLS     EQU  0D6Bh
SELDEV   EQU  1601h
         LD   A,1              ;select
                               lower screen
         CALL SELDEV
         CALL XCLSLOW          ;clear
                               lower screen
         LD   HL,PROMPT        ;prompt string
                               address
         CALL PRINT$STRING     ;display prompt
                               —see part 4
         CALL INPUT            ;see listing 2
```

At this point, HL hold the data address or zero if SHIFT/6 has been pressed (I'll ignore this for the moment). We could process it as required, but for now I will merely copy it on to the top line of the display

```
         PUSH HL               ;save data
                               pointer
         LD   A,2              ;select main
                               display
         CALL SELDEV
```

Listing 1

```
Addr Hex        Op    Operands

FA00            XKSCAN:
FA00             EQU  28EH
FA00            XKTEST:
FA00             EQU  31EH
FA00            XKDCODE:
FA00             EQU  333H
FA00            INKEY$:
FA00 CD8E02      CALL XKSCAN
FA03 0E00        LD   C,0
FA05*2000        JR   NZ,IKB
FA07 CD1E03      CALL XKTEST
FA0A*3000        JR   NC,IKB
FA0C 15          DEC  D
FA0D 5F          LD   E,A
FA0E CD3303      CALL XKDCODE
FA11 4F          LD   C,A
FA12            IKB:
FA12 69          LD   L,C
FA13 2600        LD   H,0
FA15 C9          RET
```

```
Symbols
XKSCAN 02BE     XKTEST
XKDCOD 0333     INKEY$
IKB    FA12
No error(s)
```

Listing 2

```
Addr Hex        Op    Operands

FA20            XCLRWK:
FA20             EQU  16B0H
FA20            XEDITOR:
FA20             EQU  0F2CH
FA20            XIRESET:
FA20             EQU  20A0H
FA20            KCUR:
FA20             EQU  23643
FA20            FLAGX:
FA20             EQU  23665
FA20            ERRSP:
FA20             EQU  23613
FA20            WORKSP:
FA20             EQU  23649
```

```
         CALL XCLS          ;clear entire
                            screen
         POP  HL            ;restore data
                            pointer
PDATA    LD   A,(HL)        ;now print
                            the string
         RST  10h
         LD   A,(HL)        ;get the
                            character again
         INC  HL            ;step to next
                            character
         CP   0Dh           ;is it the end?
         JR   NZ,PDATA      ;repeat if not
                            the end

PROMPT   DEFB 16            ;string length
         DEFM Enter something
```

As a small exercise you may like to alter the program given in an earlier article to use the *Inkeys* routine given this week instead of *Await$key*. The difference is very noticeable!

The last routine this week is a subroutine that converts ASCII numeric characters into a 16-bit unsigned binary value. This will help you to allow numeric data to be entered into your *Input* routine, and then to be converted for subsequent use. The subroutine is called *Asctobin* and is shown in listing 3. It expects registers HL to hold the address of the ASCII string, and on returning, HL holds the converted binary value. Conversion stops when a non-numeric character is found (numeric characters are '0'-'9' or 30h-39h).

Asctobin relies on the MUL16 subroutine given in the first article of this series. It also uses a small ROM routine at address 2D1Bh to test whether a character in register A is a valid ASCII number. Here's how to use the entire package this week:

```
LD   A,1             ;select lower screen
CALL SELDEV
CALL XCLSLOW         ;clear it
LD   HL,MESSAGE      ;print a prompt
CALL PRINT$STRING
CALL INPUT           ;obtain data
LD   A,H             ;Check if SHIFT/6 was attempted
OR   L
JP   Z,0             ;RAND USR 0 if error
CALL ASC$TO$BIN      ;convert data to binary
LD   (ITEM),HL       ;save the converted data value
```

This rounds up the current series. In the next series, later in the year, we'll move on to the floating point calculator and also study ways of using full arithmetic and printing of binary or floating point values. Personally, I tend to stay away from the calculator in machine code since it's so much easier to write this type of routine in Basic (and it runs almost as quickly!) but there are still occasions when it comes in handy. ■

By Trevor Toms, author of *The Spectrum Pocket Book*, published by Phipps Associates.

```
FA20            CHADD:
FA20             EQU  23645
FA20            INPUT:
FA20 CDB016      CALL XCLRWK
FA23 21715C      LD   HL,FLAGX
FA26 CBEE        SET  5,(HL)
FA28 CBFE        SET  7,(HL)
FA2A CBB6        RES  6,(HL)
FA2C 010100      LD   BC,1
FA2F F7          RST  30H
FA30 360D        LD   (HL),0DH
FA32 225B5C      LD   (KCUR),HL
FA35 2A3D5C      LD   HL,(ERRSP)
FA38 E5          PUSH HL
FA39*210000      LD   HL,IN$ERROR
FA3C E5          PUSH HL
FA3D ED733D5C    LD   (ERRSP),SP
FA41 CD2C0F      CALL XEDITOR
FA44 E1          POP  HL
FA45 CDA020      CALL XIRESET
FA48 2A615C      LD   HL,(WORKSP)
FA4B            INX:
FA4B E3          EX   (SP),HL
FA4C 223D5C      LD   (ERRSP),HL
FA4F FD3600FF    LD   (IY),0FFH
FA53 E1          POP  HL
FA54 C9          RET
FA55            IN$ERROR:
FA55 CDA020      CALL XIRESET
FA58 210000      LD   HL,0
FA5B 18EE        JR   INX

Symbols:
XCLRWK 16B0      XEDITO 0F2C
XIRESE 20A0      KCUR   5C5B
FLAGX  5C71      ERRSP  5C3D
WORKSP 5C61      CHADD  5C5D
INPUT  FA20      INX    FA4B
IN$ERR FA55
No error(s)
```

Listing 3

```
Addr Hex        Op   Operands

FB00            MUL16:
FB00             EQU  0FF5BH
FB00            XNUMBER:
FB00             EQU  2D1BH
FB00            ASC$TO$BIN:
FB00 110000      LD   DE,0
FB03*1800        JR   ASC3
FB05            ASC2:
FB05 E5          PUSH HL
FB06 D630        SUB  30H
FB08 5F          LD   E,A
FB09 1600        LD   D,0
FB0B D5          PUSH DE
FB0C 1E0A        LD   E,10
FB0E CD5BFF      CALL MUL16
FB11 D1          POP  DE
FB12 19          ADD  HL,DE
FB13 EB          EX   DE,HL
FB14 E1          POP  HL
FB15            ASC3:
FB15 7E          LD   A,(HL)
FB16 23          INC  HL
FB17 CD1B2D      CALL XNUMBER
FB1A EB          EX   DE,HL
FB1B 30E8        JR   NC,ASC2
FB1D C9          RET

Symbols:
MUL16  FF5B      XNUMBE 2D1B
ASC$TO FB00      ASC2   FB05
ASC3   FB15
No error(s)
```

Force and motion

Roy Masefield *presents a program based on Isaac Newton's Laws of Motion*

The name of Sir Isaac Newton conjures up in everyone's mind the one word — "gravity". But gravity is only one part of the vast field opened up by his pioneering work. This work, culminating in the formulation of his Laws of Motion, now permeates the whole of classical physics and mechanics and, of course, was the basis on which Einstein and others built their theories, modifying the work of Newton.

Until Newton's time (1642-1727) ideas of force and motion were vague, to say the least, although astronomers had already amassed a great deal of data on how the heavenly bodies moved. It was generally believed, for instance, that a body could be kept in motion only if a force were continually applied.

Newton, in a series of simple experiments and beautiful logic, showed that once set in motion by a force, the body would proceed in a straight line when the force was removed, and could go on for ever. It could only be deviated from the straight line or made to change its velocity by the application of another force. This is the essence of his first Law of Motion.

Newton did what others had failed to do: he made precise definitions of Force, Mass, Velocity, Time, Distance and Acceleration, and he derived a set of simple equations relating these quantities. His second law relates force with mass and acceleration, and the third stresses that action and reaction are equal and opposite. From these equations it is possible to deduce the behaviour of moving bodies, given certain initial data.

For our present purposes we will leave out force and mass, and assume that acceleration is produced by some unspecified force. So we have five quantities to consider: Initial Velocity (u), Final Velocity (v), Distance (s), Time (t) and Acceleration (a). There are three fundamental equations which relate these quantities:

$$s = ut + \frac{1}{2}at^2 \quad (1)$$
$$v^2 = u^2 + 2as \quad (2)$$
$$v = u + at \quad (3)$$

Given any three of these quantities, it is possible to juggle with the equations to derive the other two (except when the three given are final velocity, distance and time, because it is then impossible to find initial velocity unless we know the acceleration).

There are 12 possible combinations and so in any particular problem, it is a matter of choosing the right one. For some combinations two equations have to be used in sequence. The accompanying program was developed to automate the selection and do the donkey-work.

When RUN, you are asked to input values for u, v, s, t and a, entering a ? for the unknown quantities which are to be found. The program will then select the equations and print the answers along with the data. If the forbidden combination (v, s and t) is entered, the printout will inform you so.

Some of the equations involve taking a square root, and sometimes the data will lead to a negative value to be rooted: this is impossible for the computer, so in these cases you will again be told. In one combination (s, u and a input) there will be two times printed, generally one positive and one negative. This is because a quadratic equation has to be solved and, as you know, there are always two roots to a quadratic.

Negative times can be ignored, but two positive times means both are legitimate answers. If the roots of the quadratic are imaginary (not real) then you will be told so. Remember too, negative accelerations can be entered — they are simply decelerations. If negative velocities and distances are output, they imply motion in the opposite direction. ■

```
5 REM NEWTON'S LAWS OF MOTION
6 REM @ W.R.Masefield 1983
10 CLEAR : CLS : PRINT  TAB 5;"NEWTON'S LAWS OF MOTION": PRINT : PRINT "Five q
uantities are involved:   Initial Velocity (u); Final      Velocity (v); Distance
 (s);      Time (t); Acceleration (a)."
20 PRINT          Given three of these, the others may be found (except      for
the combination of Final    Velocity, Distance and Time)    Enter values (all in
 the same   system of units) as prompted    below. Enter a ? for the un-    know
ns."
30 INPUT "Initial Velocity?";u$,"Final Velocity?   ";v$,"Distance?          ";s$,
"Time? ";t$, "Acceleration?";a$
40 CLS : PRINT  TAB 5;"NEWTON'S LAWS OF MOTION": PRINT : PRINT  Data: : PRINT
TAB 7;"Initial Velocity: ";u$
50 PRINT  TAB 5;"Final Velocity: ";v$: PRINT  TAB 11; Distance: ";s$
60 PRINT  TAB 15;"Time: ";t$: PRINT  TAB 7;"Acceleration: ";a$: PRINT : PRINT
Results:
70 IF u$ <> "?" THEN  LET u= VAL u$
71 IF v$ <> "?" THEN  LET v= VAL v$
72 IF s$ <> "?" THEN  LET s= VAL s$
73 IF t$ <> "?" THEN  LET t= VAL t$
74 IF a$ <> "?" THEN  LET a= VAL a$
80 IF t$="?" AND a$="?" THEN  GO TO 180
90 IF v$="?" AND a$="?" THEN  GO TO 200
100 IF v$="?" AND t$="?" THEN  GO TO 220
110 IF u$="?" AND a$="?" THEN  GO TO 260
120 IF u$="?" AND t$="?" THEN  GO TO 270
130 IF u$="?" AND v$="?" THEN  GO TO 300
140 IF s$="?" AND a$="?" THEN  GO TO 320
150 IF s$="?" AND t$="?" THEN  GO TO 340
160 IF s$="?" AND v$="?" THEN  GO TO 360
170 IF s$="?" AND u$="?" THEN  GO TO 380
180 GO SUB 510: GO SUB 750
190 GO SUB 670: GO SUB 740: GO TO 410
200 GO SUB 520: GO SUB 750
210 GO SUB 630: GO SUB 720: GO TO 400
220 IF u*u+2*a*s<0 THEN  PRINT "Final Velocity cannot be found  as a negative s
quare root is    called for": GO TO 225
230 GO SUB 570: GO SUB 720
235 IF 4*u*u+8*s*a<0 THEN  PRINT  There are no real roots of the  time quadrati
c, so time cannot  be found. : GO TO 400
240 GO SUB 540: GO SUB 740
250 GO SUB 550: PRINT  TAB 17; or  ;t: GO TO 400
```

Continued on page 23

THE DAN DIAMOND TRILOGY

My name is Diamond, Dan Diamond,
and this is my story. A story of beautiful mermaids, bored robots and dank, dark dungeons. A story that started one muggy day in New York, and like the Big Apple, it's rotten to the core.



The Dan Diamond Trilogy is three separate adventure games. Each game may be played on its own, but clues may be found in the earlier adventures which may help later on. Each game comes with a lavishly illustrated 20-page case file, and hints (both helpful and misleading) which have been hidden in the illustrations.



Part I. Franklin's Tomb, in which our hero receives a mysterious plea for help, which leads him to a hidden tomb and the mystery of the stargate.

Part II. Lost in Space, in which our hero finds himself stranded on a derelict spacecraft, doomed to travel endlessly through space, or find a way out.

Part III. Fishy Business, in which our hero lands on a watery planet, discovers the secrets of the glen for help and saves the day.

"It must be the most consistently enjoyable adventure game I've ever played"
– Computer Choice (Program of the Month) –

All three programs cost £9.95 each and are available for the DRAGON 32, BBC MODEL B and 48k ORIC-1 microcomputers. (note: Fishy Business for the BBC and ORIC will be available February 1984).

Salamander SOFTWARE

17 Norfolk Road, Brighton, East Sussex, BN1 3AA.

Look out for Dan Diamond's next Adventure Series "Franklin in Wonderland" Available Spring 1984

```
260 PRINT      Data does not allow Initial Velocity or Acceleration to be  calc
ulated : GO TO 400
270 IF v*v 2*a*s 0 THEN  PRINT "Initial Velocity cannot be foundas a negative s
quare root is    called for, Hence Time also     cannot be found."; GO TO 400
280 GO SUB 560: GO SUB 710
290 GO SUB 630: GO SUB 740: GO TO 400
300 GO SUB 570: GO SUB 710
310 GO SUB 600: GO SUB 720: GO TO 400
320 GO SUB 580: GO SUB 750
330 GO SUB 590: GO SUB 730: GO TO 400
340 GO SUB 620: GO SUB 730
350 GO SUB 630: GO SUB 740: GO TO 400
360 GO SUB 590: GO SUB 730
370 GO SUB 600: GO SUB 720: GO TO 400
380 GO SUB 610: GO SUB 710
390 GO SUB 590: GO SUB 730
400 PRINT  AT 21,0;"Press n for new run, s to stop"
410 IF  INKEY$ ="" THEN  GO TO 410
420 IF  INKEY$ ="n  THEN  GO TO 10
430 STOP
500 REM Formulae SBR's
510 LET a=(v*v-u*u)/2/s: RETURN
520 LET a=2*(s-u*t)/t/t: RETURN
530 LET v= SQR (u*u+2*a*s): RETURN
540 LET t=( 2*u+ SQR (4*u*u+8*a*s))/2/a: RETURN
550 LET t=(-2*u- SQR (4*u*u+8*a*s))/2/a: RETURN
560 LET u= SQR (v*v-2*a*s): RETURN
570 LET u=(s-.5*a*t*t)/t: RETURN
580 LET a=(v-u)/t: RETURN
590 LET s=u*t+.5*a*t*t: RETURN
600 LET v=u+a*t: RETURN
610 LET u=v-a*t: RETURN
620 LET s=(v*v-u*u)/2/a: RETURN
630 LET t=(v-u)/a: RETURN
700 REM Print Results SBR's
710 PRINT  TAB 3;"Initial Velocity=";u: RETURN
720 PRINT  TAB 5;"Final Velocity=";v: RETURN
730 PRINT  TAB 11;"Distance=";s: RETURN
740 PRINT  TAB 15;"Time=";t: RETURN
750 PRINT  TAB 7;"Acceleration=";a: RETURN
```

Paint it black

J Smith presents a simple program for drawing and printing hi-res graphics

This is a very simple and relatively short program occupying just over 2K of memory. It allows the drawing of either black and white graphics in the Dragon's highest resolution or full colour in medium resolution with the added capability of painting in different areas of the screen. In addition both the monochrome and colour screens can be transferred to permanent copy using the four colours of the Tandy CGP 115 printer.

In fact though the program is short and simple it appears to offer similar capabilities to the commercial programs now appearing on the market. The program listing and notes which follow explain how it works, so I shall only add a brief description of the use of the right joystick for drawing and the keyboard for selecting the other facilities.

Joystick functions — on running the program you are asked to select monochrome or colour drawing. Having done so, you are given a clean 'sheet' of white screen to draw on, with the cursor flashing at the top right corner. The drawing colour is automatically set to white at start up, so the joystick can move the cursor about without leaving a trail.

To start drawing, use key *6* for black and *5* to return to white (which can therefore be used to draw over and 'rub-out' any incorrect lines). In full colour, use key *6* for cyan (printed as green), *7* for magenta (blue) and *8* for orange (red), again returning to *5* for white (to move without drawing or to rub-out).

Keyboard functions — to fill in a shape with colour (or black) first make sure that the shape is complete with no gaps (or else the "paint" will leak out and cover the whole screen). Next, move the cursor so that it is inside the shape. Then, press the *F* key and the joystick button.

To clear the whole screen to white, just press *C* at any stage of drawing. If you decide you want to change from black and white to full colour or vice-versa, then press *B* which returns you to the colour selection screen.

To use the tape recorder press *S*. This will give you a prompt to start the tape running by setting the recorder to *Play*. When you have found the bit of tape you want (which will be either a clean part for saving a picture on or the start of a file containing a picture that you wish to load) press the *Enter* key and the tape recorder will stop.

You will then receive a prompt to put the tape recorder at the appropriate setting for saving or loading, with a further request to press *Enter*. The final prompt is to input *1* or *2* to save or load respectively. These two functions are then carried out automatically after which you are returned to the drawing screen again.

The last keyboard function is to press *P*, which will automatically set the printer to reproduce the drawing on the screen. By turning the picture on its side (see notes for line 630) the full width of the paper is used for the shorter vertical side of the screen, while the longer, horizontal side of the screen, is printed down the length of the paper. If you are only printing a drawing or a small section of the screen, you can stop the printer and return to the main drawing program at any time by pressing *R*.

Apart from using this program freehand, as it were, it is also possible to extract the printing subroutine at lines 600 to 770 and incorporate it into any other basic program with the *Gosub* lines inserted at the appropriate point. Ie, in your own main program insert lines 220 and 430 to lead the program to the screen printing subroutine when key *P* is pressed.

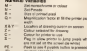
One other way of printing a hi-res screen from any Basic program which is already running is to use the following sequence. *Break* the program at the scene you wish to print. This, of course, returns you to the text screen (although the hi res screen is not on view it is still in memory and can be brought back using *Screen 1, 1*). Next load my program from tape. Then *Edit* line 100, remove the *PCLS5* (so that the hi-res picture is not erased) and type in direct mode (ie, do not use a line number) *Goto 70*. Do not use Run or memory is wiped clean.

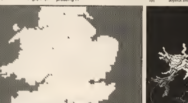
You will then be asked to select the appropriate colour mode. After inputting *1* or *2* you will have the scene from the previous program displayed. As you are now in the main program loop, press *P* and the printer will be set into action.

Acknowledgement — as will be obvious to anyone who has a copy of the excellent book *The Working Dragon 32*, lines 260 and 270 and the general structure of the tape save/load subroutine are based on ideas by David Lawrence.

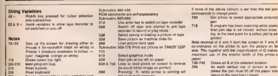
Numeric Variables

M –	Set monochrome or colour
N –	Set Pmode
R –	Size of printed pixel
Q –	Magnification factor to fill the printer paper width
X & Y –	Location of drawing cursor on screen
Z –	Colour selected for drawing
C –	Colour for printer to use
S –	Flag to allow printer to jump pixels which are not set on the screen (ie white)
PE –	Peek to see if joystick button is pressed.
J(I)	Joystick allocation









String Variables

A$ = Reads key pressed for colour selection and subroutines

E$ & I$ = Blank variables to allow tape recorder to be switched on and off

Notes

70-100	Sets up the screen for drawing either in Pmode 4 (hi-resolution black on white) or Pmode 1 (medium resolution in colour — cyan magenta orange on white)
110	Draws cursor top right.
200-310	Main program loop
210	Read joystick.
220	Read keyboard
230	If no key pressed then colour selection (set by Z) remains the same
240	If alphabetic key pressed go to subroutine 400
250	Store value of numeric key pressed in Z to maintain colour chosen
260-270	Moving right joystick moves cursor
280-290	Make cursor flash on and off so it is not lost against background
310	Return to start of main program

Subroutine 400-460

REM statements are self-explanatory

Subroutine 500-590

510	Use enter key to switch on tape recorder
520	Switch off tape and prompt to put tape recorder in record or play mode
530	Select saving or loading a picture on tape
550	Save picture as machine code file
580	Load picture from tape

Subroutine 600-770 Print out picture on TANDY CGP 115

610	Select graphics mode
620	Start pen at top left on paper
630 & 760	Loop to read pixels on screen in reverse (to avoid mirror image on printer)
640	Pressing "R" while printer is running will return to main program
650	Read colour of pixel on screen.
660	If colour is white jump drawing routine to leave paper blank
670	If pixel colour is cyan set pen colour to green
680	If pixel colour is magenta set pen colour to blue
690	If pixel colour is black (in Pmode 4) set pen to black

If none of the above colours is set then the red pen corresponds to orange pixels

700	Get printer to select appropriate coloured pen
710	If program has been scanning white pixels then pen has to be moved without drawing to the next point for a colour plot to be printed

Note reversal of X and Y from the screen to Y and X co-ordinates on the printer to turn the picture on its side. This together with the magnification of Q makes maximum use of the smaller width of this printer's paper

720-740	Draws an X at the selected location
760	As each vertical line of screen is completed the pen must lift off the paper and return to the next line of pixels
770	Return pen to left side of paper when the picture is completed

Subroutine 800-820

If joystick button is pressed the area is painted in starting at the cursor and using the same colour as the cursor extending until it reaches a surrounding line of similar colour (hence the need to ensure the area to be painted is completely enclosed) ■

```
10 '          *********************
20 '          *      D.A.P.       *
30 '          * DRAW  AND  PRINT  *
40 '          *    J.A.Smith      *
50 '          *     10/12/83      *
60 '          *********************
70 CLS:PRINT:PRINT:PRINT"ENTER COLOUR SE
LECTION. ,,,,"1.BLACK ON WHITE","2.FULL
COLOUR":PRINT:PRINT:INPUT"ENTER 1 OR 2";M
80 N=1:R=5:Q=2.5
90 IFM=1 THEN N=4:R=2:Q=2
100 PMODEN,1:PCLS5:SCREEN1,1
110 X=255:Y=0
200 'Main Program Loop.
210 FORI=0 TO3:J(I)=JOYSTK(I):NEXT
220 A$=INKEY$
230 IFA$="" THENA$=STR$(Z)
240 IFASC(A$)>60 THEN400
250 Z=VAL(A$):IFZ<5 ORZ>8 THEN Z=5
260 X=X-M*(J(0)>50)+M*(J(0)<14):X=X+M*(X
>255)-M*(X<R)
270 Y=Y-M*(J(1)>50)+M*(J(1)<14):Y=Y+M*(Y
>191)-M*(Y<0)
280 IFZ=5 THEN PSET(X,Y,Z):PSET(X,Y,8):F
ORD=1 TO100:NEXT:PSET(X,Y,Z)
290 PSET(X,Y,Z):PSET(X,Y,5):FORD=1 TO100
:NEXT:PSET(X,Y,Z)
300 FORD=1 TO100:NEXT
310 GOTO200
400 'Keyboard Input.
410 IFA$="C"THENPCLS5 '              Press
C to clear screen.
420 IFA$="F"THENGOSUB800 '           Press
F to fill area with colour.
430 IFA$="P"THENGOSUB600 '           Press
P to transfer picture to printer.
440 IFA$="S"THENGOSUB500 '           Press
S to save or load on tape.
450 IFA$="B"THEN70 '                 Press
B to change colour selection.
460 GOTO200
500 'Save or Load Picture on Tape.
510 MOTORON:AUDIOON:CLS:INPUT"PRESS play
 TO POSITION TAPE THENPRESS enter TO STO
P. ";E$
520 MOTOROFF:AUDIOOFF:PRINT:PRINT:INPUT"
PUT RECORDER AT record TO SAVE  OR play
TO LOAD A SCREEN. THEN  PRESS enter",I$
530 PRINT:PRINT:PRINT"WHICH DO YOU WISH
TO DO ?","1....SAVE SCREEN.","2....LOAD
SCREEN.":INPUT"enter  1 OR 2";I:ONI GOTO
550,580
540 SCREEN1,1:RETURN
550 MOTORON:FORD=1 TO3000:NEXT:CSAVEM"SC
REEN",1536,7679,6144
560 SCREEN1,1
570 RETURN
580 PCLS:CLOADM"SCREEN",0
590 SCREEN1,1:RETURN
600 'Dump Screen to Printer.
610 PRINT#-2,CHR$(18)
620 PRINT#-2,"I"
630 FORX=255 TO 0 STEP-M:FORY=0 TO191STE
P M
640 A$=INKEY$:IFA$="R"THEN PRINT#-2,"A":
RETURN '    Press R to stop printer and
return.
650 C=PPOINT(X,Y):C=C-5
660 IFC=0 THENS=1:GOTO760
670 IFC=1 THEN C=2:GOTO700
680 IFC=2 THEN C=1
690 IFC=-5 THENPRINT#-2,"C0":GOTO710
700 PRINT#-2,"C";C
710 IFS=1 THENS=0:PRINT#-2,"M";Y*Q;",";-(
(255-X)*Q)
720 PRINT#-2,"J";R",",-R
730 PRINT#-2,"R";-R",0"
740 PRINT#-2,"J";R",",R
750 IFY=192-M THENPRINT#-2,"M0,";-((255-
(X-M))*Q)
760 NEXTY:NEXTX
770 PRINT#-2,"A":RETURN
800 'Fill Area with Colour.
810 PSET(X,Y,Z-1):PE=PEEK(65280):IFPE=25
4ORPE=126THENPAINT(X,Y),Z,Z ELSE 810
820 RETURN
```

TURN YOUR PROGRAMME UPSIDE DOWN

Now you can add another dimension to your games. Swap direction, swap functions, confuse your friends. In fact you can add almost any twist to your games with Stonechip's Programmable Joystick Interface.

You can also listen to them with Stonechip's Echo Amplifier.



Programmable Joystick Interface This also enables any Spectrum software to be used with a joystick, irrespective of which keyboard keys have been chosen for function

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Echo Amplifier How would you like to listen to the sound output from your ZX-Spectrum without ear strain? The Stonechip Echo amplifier can do this for you as well as easing the tedium of saving or loading of tapes and enlarging the range of tape recorder compatibility with the computer The amplifier has volume control over a range adequate for most uses and a tone control for harsh or mellow sounds A switched interface removes the need to swap leads during SAVE'ing or LOAD'ing Leads are left connected all the time and the desired function is selected on the three position switch by the user Use of the CUE facility enables an audio cue to precede the program being SAVE d on tape, a decided advantage when searching through a multi-program tape The Echo simply plugs into the Ear, Mic and Power sockets of the computer and does not require an additional power supply The expansion port at the rear of the computer is left free for use with other peripherals and the unit is housed in an attractive case custom designed to complement the ZX Spectrum



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Graphic power

***D Cartwright** presents a demonstration program of five graphic subroutines*

This is a demonstration program which shows the speed and power of BBC graphics. Several options are available to the user:

A	draw an elipse
B	draw a triangle
C	draw a square
D	draw a pentagon
E	draw a gool pattern

Although written on a 1.2 OS model, the program runs on a BBC model A or B. It can easily be adapted for 1.0 models by changing the VDU 23,8202 0;0;0; which turns off the cursor.

Notes

150	inputs access code
190	if access code entered is 374375 then proceed to menu
200-410	elliptical subroutine
420-620	triangular subroutine
630 840	square subroutine
630 1130	pentagon subroutine
1140 1300	gool pattern subroutine
1310 1620	menu

```
  1 REM****BEEB GRAPHICS****
  2 REM****     BY      ****
  3 REM****D.CARTWRIGHT ****
  4 REM**** COPYRIGHT   ****
  5 REM**** JULY 1983   ****
 10 MODE2
 20 VDU 23:8202:0:0:0;
 30 COLOUR132:CLS
 40 COLOUR5
 50 PRINT TAB(7,14)"HELLO"
 60 PRINT TAB(5,16)"I'm a Beeb"
 70 COLOUR 0
 80 PRINT TAB(3,20)"Listen to this"
 90 FOR S=0 TO 240
100 SOUND1.-15.S.1
110 NEXT S
120 FOR T=240 TO 0 STEP -1
130 SOUND1.-15.T.1
140 NEXT T
150 COLOUR 1
160 PRINT TAB(2.25)"Enter six digit'
170 PRINT TAB(2,26)" access code"
180 INPUT A$
190 IF A$="374375" GOTO 1310 ELSE 160
200 MODE1
210 VDU 23;8202:0;0;0:
220 COLOUR129:CLS:COLOUR2
230 VDU 29,640;512;
240 PRINT TAB(1,1)"Coordinates of
    Elipse (width,hight)"
250 INPUT B.C
260 MOVE COS1*(B/2),SIN1*(C/2)
270 FOR P=1 TO 139 STEP 6
280 DRAW COSP*(B/2).SINP*(C/2)
290 SOUND 1,-15,255.0.25
300 NEXT
310 LET G=0
320 REPEAT
330 LETG=G+1
340 UNTIL G>1000
350 MODE2
360 VDU 23;8202;0;0;0;
370 COLOUR129:CLS:COLOUR4
380 PRINT TAB(2.10)"Another go (Y-N)"
390 INPUT F$
400 IF F$="Y" THEN GOTO 200
410 IF F$="N" THEN GOTO 1310 ELSE
    GOTO 380
420 MODE1
430 VDU 23;8202;0;0;0:
440 COLOUR 129:CLS:COLOUR 2
450 PRINT TAB(1.1)"Coordinates for
    triangle (3 points)"
460 INPUT F.G
470 INPUT
480 INPUT
490 MOVE F,G
500 DRAW H,J
510 PLOT 85,K,L
520  LET G=0
530 REPEAT
540 LETG=G+1
550 UNTIL G>1000
560 MODE2
570 VDU 23;8202;0;0;0:
580 COLOUR129:CLS:COLOUR4
590 PRINT TAB(2.10)"Another go (Y-N)"
600 INPUT F$
610 IF F$="Y" THEN GOTO 420
620 IF F$="N" THEN GOTO 1310 ELSE
    GOTO 600
630 MODE1
640 VDU 23;8202:0;0;0:
650 COLOUR 129:CLS:COLOUR 2
660 PRINT TAB(1,1)"Lenght of a side
    of the square"
670 INPUT A
680 D=A/2
690 MOVE 600-B.500-B
700 DRAW 600+B.500-B
710 DRAW 600+B.500+B
720 DRAW 600-B,500+B
730 DRAW 600-B.500-B
740 LET G=0
750 REPEAT
760 LET G=G+1
770 UNTIL G>1000
780 MODE2
790 VDU 23;8202;0;0:0;
800 COLOUR129:CLS:COLOUR4
810 PRINT TAB(2.10)"Another go (Y-N)"
820 INPUT F$
830 IF F$="Y" THEN GOTO 630
840 IF F$="N" THEN GOTO 1310 ELSE
    GOTO 820
850 MODE1
860 VDU 23;8202;0;0:0;
870 COLOUR 129:CLS:COLOUR 2
880 PRINT TAB(1.1)"Lenght of a side
    of a pentagon"
890 INPUT K
900 MOVE 100,50:DRAW 1140,50
910 J=K/2
920 MOVE 600-J,100
930 DRAW 600+J,100
940 A=SIN(72)*K
950 B=COS(72)*K
```

```
[illegible]
970 MOVE [illegible]
980 DRAW 60[illegible],100-B
990 C=SIN(57.[illegible]K
1000 DRAW 600,100-B+C
1010 MOVE 600+J+A,100-B
1020 DRAW 600,100-B+C
1030 LET G=0
1040 REPEAT
1050 LET G=G+1
1060 UNTIL G>1000
1070 MODE2
1080 VDU 23;8202;0;0;0;
1090 COLOUR 129:CLS:COLOUR 4
1100 PRINT TAB(2,10)"Another go [illegible]
1110 INPUT F$
1120 IF F$="Y" THEN GOTO 850
1130 IF F$="N" THEN GOTO 1?10 ELSE
     GOTO1110
1140 MODE4
1150 VDU 23;8202;0;0;0;
1160 VDU 29,640;512;
1170 FOR A=0 TO 8
1180 GCOL A,1
1190 FOR B=1 TO 512 STEP 6
1200 MOVE 512-B,512-B
1210 DRAW B,-B
1220 DRAW -(512-B),-(512-B)
1230 DRAW -B,B
1240 DRAW 512-B,512-B
12?0 NEXT
[illegible] NEXT
1270 LET [illegible]
1280 REPEAT
1290 LET [illegible]
1300 UNTIL G>1000
1310 MODE1
1320 VDU 23;8202;0;0;0;
1330 COLOUR 129:CLS:COLOUR2
1340 PRINT TAB(15,2)"Menu"
1350 PRINT TAB(2,8)"When ever you
     wish to return to the "
1360 PRINT TAB(2,9)"Menu simply press
     key N at the end"
1370 PRINT TAB(2,13)"What do you
     wish to do"
1380 PRINT TAB(4,16)"A= Elipses"
1390 PRINT TAB(4,17)"B= Triangles"
1400 PRINT TAB(4,18)"C= Squares"
1410 PRINT TAB(4,19)"D= Pentagons"
1420 PRINT TAB(4,20)"E= Graphics"
1430 PRINT TAB(4,21)"F= Stop program"
1440 INPUT R$
1450 IF R$="A" GOTO 200
1460 IF R$="B" GOTO 420
1470 IF R$="C" GOTO 630
1480 IF R$="D" GOTO 850
1490 IF R$="E" GOTO 1140
1500 IF R$="F" GOTO 1520
1510 GOTO 1440
1520 MODE7:END
```


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Character information

Laa Allan presents a program to transfer data from ROM into RAM

Where the video interface chip gets its character information is important to graphic programming Normally, the chip gets this data from the Character Generator ROM which stores the patterns that make up the various letters numbers, punctuation symbols and other things as seen on the keyboard One of the more significant features of the Commodore 64 is the ability to transfer these shapes from ROM into RAM and to alter these to create user defined graphics for games business applications, etc

However, data transfer from ROM into RAM can cause a considerable delay prior to the running of a program This can be particularly annoying when de-bugging a routine which relies on this feature at the start of a program The comparison between the Basic and machine code routines clearly indicates the advantages to be gained by transferring this data in machine code

Functional listing

10	clear screen printing colour purple
12	screen line border black
14-52	text and routine for comparison
36	initiate basic routine
48	print time taken (note timer turned off by keyscan interrupt)
48	initiate machine code routine
58	print time taken (note time taken is related to basic entry of machine code)
98-74	basic code routine
62	lower memory pointers
92	turn off keyscan interrupt timer
68	switch in character
66	transfer complete character set (upper case and lower case)
66	switch in I/O
70	restart keyscan interrupt timer
82-96	machine code routine
92	set variables
86	read data poke into memory keep running total of sum of data
86	error trap routine for incorrect data entry
88	action machine code
96-116	decimal code for machine code routine

Machine Code Routine

49152	load accumulator with 48 (12288/256)
49154	store in 52 (bottom of string pointer)
49157	store in 56 (top of memory pointer)
49160	load accumulator with 254
49162	logical AND with contents of 56334
49165	store in 56334
49168	load accumulator with 251
49170	logical AND with contents of 1
49173	store in 1
49175	load x register with 0
49178	load accumulator with x increment starting 53248
49181	store with x increment starting 12288
49184	load accumulator with x increment starting 53504
49187	store with x increment starting 12544
49190	load accumulator with x increment starting 53760
49193	store with x increment starting 12800
49196	load accumulator with x increment starting 54016
49199	store with x increment starting 13056
49202	load accumulator with x increment starting 54272
49205	store with x increment starting 13312
49208	load accumulator with x increment starting 54528
49211	store with x increment starting 13568
49214	load accumulator with x increment starting 54784
49217	store with x increment starting 13824
49220	load accumulator with x increment starting 55040
49223	store with x increment starting 14080
49226	load accumulator with x increment starting 55296
49229	store with x increment starting 14336
49232	load accumulator with x increment starting 55552
49235	store with x increment starting 14592
49238	load accumulator with x increment starting 55808
49241	store with x increment starting 14848
49244	load accumulator with x increment starting 56064
49247	store with x increment starting 15104
49250	load accumulator with x increment starting 56320
49253	store with x increment starting 15360
49256	load accumulator with x increment starting 56576
49259	store with x increment starting 15616
49262	load accumulator with x increment starting 56832
49265	store with x increment starting 15872
49268	load accumulator with x increment starting 57088
49271	store with x increment starting 16128
49274	increment x register by 1
49275	branch forward 3 if equal to 0
49277	jump to 49178 until x register equals 0
49280	load accumulator with 4
49282	logical OR with contents of 1
49285	store in 1
49288	load accumulator with 1
49290	logical OR with contents of 56334
49293	store in 56334
49296	load accumulator 240
49298	logical AND with contents of 53272
49301	logical OR with 12
49303	store in 53272
49306	return to Basic

```
10 PRINTCHR$(147)CHR$(156)
12 POKE53280,0 POKE53201,0
14 PRINTTAB(3)"DATA TRANSFER ROUTINES"
16 PRINT PRINT PRINTCHR$(159)
18 PRINTTAB(2)"THESE  TWO   ROUTINES  WI
   LL  CLEARLY"
20 PRINT
22 PRINTTAB(2)"DEMONSTRATE  THE ADVANTAG
   ES IN USING"
24 PRINT
26 PRINTTAB(2)"A MACHINE CODE  ROUTINE
   TO TRANSFER"
28 PRINT
30 PRINTTAB(2)"THE CHARACTER SET FROM RO
   M INTO RAM."
32 PRINT PRINT PRINTCHR$(152)
34 PRINTTAB(7)"TRANSFER OF DATA BY BASIC"
36 GOSUB60
38 PRINTCHR$(129)
40 PRINTTAB(7)"TIME TAKEN....... ",CHR$(
   158)"72 SECS"
42 PRINT PRINTCHR$(152)
44 PRINTTAB(4)"TRANSFER OF DATA BY MACHI
   NE CODE'
46 PRINTCHR$(30)
48 GOSUB82
50 PRINTTAB(7)"TIME TAKEN....... ",CHR$(
   153),INT((T2-T1)/60),"SECS"
52 GOTO52
54
56 REM ## BASIC CODE ROUTINE ##
58
60 POKE52,48 POKE56,43
62 POKE56334,PEEK(56334)AND254
64 POKE1,PEEK(1)AND251
66 FORI=0TO4095 POKE12288+I,PEEK(53248+I
   ) NEXT
68 POKE1,PEEK(1)OR4
70 POKE56334,PEEK(56334)OR1
72 POKE53272,(PEEK(53272)AND240)OR12
74 RETURN
76
78 REM ## MACHINE CODE ROUTINE ##
80
82 T=0 SUM=0 T1=TI
84 READA IFA<>-1THENPOKE49152+T,A T=T+1
   SUM=SUM+A GOTO84
86 IFSUM<>15392THENPRINT'  ERROR IN DATA
   STATEMENTS  STOP!!!!" STOP
88 SYS49152 T2=TI
90 RETURN
92
94 REM ## DATA FOR MACHINE CODE ROUTINE
   ##
96
98 DATA169 48,141,52,0,141,56,0,169,254,
   45,14,220,141,14,220
100 DATA169,251,45,1,0,141,1,0,162,0,189
   ,0,208,157,0,48
102 DATA189,0,209,157,0,49,189,0,210,157
   ,0,50,189,0,211 157
104 DATA0,51,189,0,212,157,0 52,189,0,21
   3,157,0,53,189 0
106 DATA214,157,0,54,189,0,215,157,0,55,
```

```
       189,0,216,157,0,56
106 DATA189,0,217,157,0,57,189,0,218,157
       ,0,58 189,0,219,157
110 DATA0,59,189,0,220,157,0,60,169,0,22
       1,157,0,61,189,0
112 DATA222,157,0,62,189,0,223,157,0 63,
       232,240,3,76,26,192
114 DATA169,4,13,1,0,141,1,0,169,1,13,14
       ,220,141,14,220
116 DATA169,240,45,24,208,9,12,141,24 20
       8,96
118 DATA-1
120
122
```

```
124 REM ########################
126 REM ########################
128 REM ###                  ###
130 REM ### DATA TRANSFER    ###
132 REM ###                  ###
134 REM ### COMMODORE  64    ###
136 REM ###                  ###
138 REM ###    LES ALLAN     ###
140 REM ###                  ###
142 REM ###     9.12.82      ###
144 REM ###                  ###
146 REM ########################
148 REM ########################
```

Address Decml	Hex	Machine Code	Assembly Code Program	
49152	C000	A9 30	LDAIM	48
49154	C002	8D 34 00	STA	52
49157	C005	8D 38 00	STA	56
49160	C008	A9 FE	LDAIM	254
49162	C00A	2D 0E DC	AND	56334
49165	C00D	8D 0E DC	STA	56334
49168	C010	A9 FB	LDAIM	251
49170	C012	2D 01 00	AND	1
49173	C015	8D 01 00	STA	1
49176	C018	A2 00	LDXIM	0
49178	C01A	BD 00 D0	LDAX	53248
49181	C01D	9D 00 30	STAX	12288
49184	C020	BD 00 D1	LDAX	53504
49187	C023	9D 00 31	STAX	12544
49190	C026	BD 00 D2	LDAX	53760
49193	C029	9D 00 32	STAX	12800
49196	C02C	BD 00 D3	LDAX	54016
49199	C02F	9D 00 33	STAX	13056
49202	C032	BD 00 D4	LDAX	54272
49205	C035	9D 00 34	STAX	13312
49208	C038	BD 00 D5	LDAX	54528
49211	C03B	9D 00 35	STAX	13568
49214	C03E	BD 00 D6	LDAX	54784
49217	C041	9D 00 36	STAX	13824
49220	C044	BD 00 D7	LDAX	55040
49223	C047	9D 00 37	STAX	14080
49226	C04A	BD 00 D8	LDAX	55296
49229	C04D	9D 00 38	STAX	14336
49232	C050	BD 00 D9	LDAX	55552
49235	C053	9D 00 39	STAX	14592
49238	C056	BD 00 DA	LDAX	55808
49241	C059	9D 00 3A	STAX	14848
49244	C05C	BD 00 DB	LDAX	56064
49247	C05F	9D 00 3B	STAX	15104
49250	C062	BD 00 DC	LDAX	56320
49253	C065	9D 00 3C	STAX	15360
49256	C068	BD 00 DD	LDAX	56576
49259	C06B	9D 00 3D	STAX	15616
49262	C06E	BD 00 DE	LDAX	56832
49265	C071	9D 00 3E	STAX	15872
49268	C074	BD 00 DF	LDAX	57088
49271	C077	9D 00 3F	STAX	16128
49274	C07A	E8	INX	
49275	C07B	F0 03	BEQ	3
49277	C07D	4C 1A C0	JMP	49178
49280	C080	A9 04	LDAIM	4
49282	C082	0D 01 00	ORA	1
49285	C085	8D 01 00	STA	1
49288	C088	A9 01	LDAIM	1
49290	C08A	0D 0E DC	ORA	56334
49293	C08D	8D 0E DC	STA	56334
49296	C090	A9 F0	LDAIM	240
49298	C092	2D 18 D0	AND	53272
49301	C095	09 0C	ORAIM	12
49303	C097	8D 18 D0	STA	53272
49306	C09A	60	RTS	

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Las Vgas

on Vic 20

Full instructions are included in the program for this game. The game is written for a 3.5K Vic20 and has been written in two parts. The first part must always be loaded and run before the second part as this is the part which sets up the udg's and tells the instructions.

The second part is the game itself, there is a little room for improvement mainly adding more colour and sound. One thing I forgot to add in the instructions is that every time you drop a coin you lose a chance and after you have lost three chances then you are sacked.

To make getting to the game (bonus) easier you must do the following and change line 34 to the following

IF RIGHT$ (SC$ 2) = 50 OR RIGHT$ (SC$,2) = 00 THEN GOTO 1000 £ dollar

Program notes

1-8	Setting up of the game
9	Prints the man on the screen
10	Take character which is pressed
11-12	Act on which character is pressed
13-17	Prints data on score etc
18	Prints coin deletes old coin
19-24	Move coin down one if already on the screen and if no coin on screen put one on
25-27	Check if the coin has been missed on. If it has reset it back to the top
28-31	If coin is caught then add to score and make noise
33-34	Check if score is 100 200 etc and if it is goto bonus game
35	Go back to the start of the loop line 8'
1000-1014	Print instructions for the bonus game
1113-1151	The playing of the bonus game
2000-2018	End of the game. If high scorer take and there name
3000-3003	Sound when a coin has been caught

```
0 GOSUB62
2 PRINT"INSTRUCTIONS
4 PRINT"YOU HAVE BEEN HIRED TO",
5 PRINT"COLLECT THE MONEY THAT",
6 PRINT"THE GAMBLERS AT THE"
7 PRINT"COMMODORE CASINO DROP."
8 PRINT"YOUR PAY IS ONLY A "
9 PRINT"MEORE 10% OF THE MONEY",
11 PRINT"AS A BONUS YOU ARE"
12 PRINT"ALLOWED TO PLAY YOUR-"
13 PRINT"SELF EVERY TIME YOU "
14 PRINT"COLLECT A HUNDRED £'S"
15 PRINT"PRESS ANY KEY TO CONT!",
16 POKE198,0 WAIT198,1 POKE198,0
17 PRINT"THIS MONEY IS NOT TAX-",
18 PRINT"ED OR ALTERED IN        ANYWAY."
19 PRINT"CONTROL -
20 PRINT"   ,-LEFT"
21 PRINT"   .-RIGHT"
22 PRINT"[F1]-STARTS WHEEL"
23 PRINT"   ■-STOPS WHEEL"
24 PRINT"GOODLUCK"
25 PRINT"INSTRUCTIONS
27 PRINT"PRESS ANY KEY
   TO CONT!",
28 POKE198,0 WAIT198,1 POKE198,0
29 PRINT"PLEASE WAIT"
30 POKE52,28 POKE56,28 CLR
31 FORI=7168TO7679 POKEI,PEEK(I+25600)
   NEXT
32 FORI=7168TO7279 READA POKEI,A NEXT
33 POKE36869,255
34 DATA2,116,24,24,60,126,60,24
35 DATA63,127,96,96,96,96,255,255
36 DATA222,254,6,6,6,6,255,255
37 DATA40,40,32,63,33,56,160,236
38 DATA0,0,0,255,255,186,40,56
39 DATA24,60,126,255,255,126,60,24
40 DATA0,0,0,0,7,15,15,15
41 DATA0,0,0,0,255,255,255,255
42 DATA0,0,0,0,224,240,240,240
43 DATA15,15,15,15,15,15,15,15
44 DATA240,240,240,240,240,240,240,240
45 DATA15,15,15,15,255,255,255,255
46 DATA255,255,255,255,255,255,255,255
47 DATA240,240,240,240,255,255,255,255
48 FORI=7280TO7359 READA POKEI,A NEXT
49 DATA120,60,68,120,60,68,60,120
50 DATA24,36,66,66,126,66,66,66
51 DATA66,66,66,66,126,66,66,66
52 DATA60,24,24,24,24,24,24,60
53 DATA60,66,128,129,129,129,66,60
54 DATA129,193,161,145,137,133,131,129
55 DATA66,66,66,66,66,66,66,60
56 DATA62,66,64,56,4,4,60,120
57 DATA120,68,68,120,64,64,64,64
58 DATA36,36,36,60,4,4,36,24
59 POKE36869,240
60 PRINT"NOW NEW THIS PROGRAM  AND LOAD
   THE NEXT PARTOF THE PROGRAM."
61 END
62 PRINT"■ ■■ ■■        ■ ■ ■ ■
   ■ ■■ ■■        ■ ■ ■ ■"
63 PRINT"■■ ■ ■ ■■"
64 PRINT"■ ■ ■ ■■ ■■ ■■ ■■ ■ ■ ■
   ■  ■ ■ ■  ■ ■ ■■ ■ ■■ ■■ ■■",
65 PRINT" ■ ■ ■  ■ ■ ■ ■  ■  ■ ■■
   ■■ ■ ■ ■■"
66 PRINT"          BY PAUL HAMPSON"
67 PRINT"INSTRUCTIONS (Y OR N)"
68 GETA$ IFA$=""THEN68
69 IFA$="Y"THENRETURN
70 IFA$="N"THEN29
71 GOTO68

1 NI=0
2 PRINT"" POKE36869,255 SC=0 BN=0 G=0
  L=3 A=6 C=0
3 PRINT"" D$(1)="" D$(2)="
  " D$(3)="
  "
5 PRINT"LLLLLLLLLLLLLLL
  LLLLLL",
6 PRINT"LLLLLLLLLLLLLLLLLLLLLL",
7 PRINT"IIIIIIIIIIIIIIIIIIIILLLLLLLLL
  LLLLLLLLLLL"
8 PRINT"ABAB"
9 PRINT"",TAB(A),"CD"
10 GETZ$ POKE650,128
11 IFZ$=","ANDA>6THENA=A-2 PRINT"",TAB
   (A+2),"  "
12 IFZ$="."ANDA<14THENA=A+2 PRINT"",
   TAB(A-2),"  "
13 PRINT"PQ  ",NI
15 PRINT"CD  ",L
16 PRINT"VOW ",SC
17 PRINT"NRS ",BN
18 PRINTD$(S),"" PRINTD$(S+3)," "
```

```
19 IFC=0THENS=INT(RND(1)*3)+1
20 B=RND(1) IFB>.95THENC=1
24 IFC=1THEND$(S)=D$(S)+"X" D$(S+3)=D$
   (S)+"]" X=X+22
25 IFS=1ANDX>196THEND$(S)="■■■■■■■■■■■■■
   " X=0 C=0 L=L-1 IFL<1THENGOTO2000
26 IFS=2ANDX>196THEND$(S)="■■■■■■■■■■■■
   ■■■■" X=0 C=0 L=L-1 IFL<1THENGOTO2000
27 IFS=3ANDX>196THEND$(S)="■■■■■■■■■■■■
   ■■■■■■■■■" X=0 C=0 L=L-1 IFL<1THEN2000
28 IFA=6ANDS=1ANDX=176THENSC=SC+1 C=0
   X=0 PRINTD$(S)," " D$(S)="■■■■■■■■■■
   ■■■' GOSUB3000
29 IFA=10ANDS=2ANDX=176THENSC=SC+1 C=0
   X=0 PRINTD$(S)," " D$(S)="■■■■■■■■■■
   ■■■■■■■" Q=1
30 IFA=14ANDS=3ANDX=176THENSC=SC+1 C=0
   X=0 PRINTD$(S)," " D$(S)="■■■■■■■■■■
   ■■■■■■■■■■■■" Q=1
31 IFQ=1THENGOSUB3000
33 SC$=STR$(SC)
34 IFRIGHT$(SC$,2)="00"THENGOTO1000
35 GOTO8
1000 POKE36869,240 PRINT"■BONUS GAME
   WELL DONE"
1001 PRINT"F1=STARTS WHEEL"
1002 PRINT"* STOPS ALL THE WHEELS",
1003 PRINT"■■111=PAYS £10"
1004 PRINT"222=PAYS £20"
1005 PRINT"333=PAYS £50+EXTRA GO"
1006 PRINT"■■■PRESS ANY KEY TO CONT!■",
1007 POKE198,0 WAIT198,1 POKE198,0
1010 PRINT"■" POKE36869,255
1011 PRINT"■LLLLLLLLLLLLLLLLLLLLNR8 ",
   BN,"0  ",G
1012 PRINT"■■■LLLLLLLLLLLLLLLLLLLLLL'
1013 PRINT"■■■■■■■■■■FGGGH I    J
   KLLLM"
1014 GETF$ IFF$<>"■"THEN1013
1113 Z=0
1114 A1=INT(RND(1)*3)+1
1115 A2=INT(RND(1)*3)+1
1116 A3=INT(RND(1)*3)+1
1117 C1=48+A1 C2=48+A2 C3=48+A3
1118 POKE7861,C1 POKE7862,C2 POKE7863,
   C3 POKE38581,5 POKE38582,5 POKE38
   583,5
1137 FORI=1TO10 GETH$ IFH$<>""THEN
   GOTO1142
1138 NEXT
1142 IFH$="*"THEN1145
1144 GOTO1114
1145 IFA1=1ANDA2=1ANDA3=1THENBN=
   BN+10 L=1
1146 IFA1=2ANDA2=2ANDA3=2THENBN=
   BN+20 L=1
1147 IFA1=3ANDA2=3ANDA3=3THENBN=
   BN+50 L=1
1148 IFA1=3ANDA2=3ANDA3=3THENG=G+1
1149 IFL=1THENL=0 GOTO1010
1150 IFG>0THENG=G-1 GOTO1010
1151 FORI=1TO1500 NEXT A=6 SC=SC+1 GOTO3
2000 POKE36869,240
2001 PRINT"■YOU'RE FINISHED AT
   THE COMMODORE CASINO. "
2002 PRINT"YOU COLLECTED ",SC/10+BN,"£'S
2003 Q=(SC/10)+BN
2004 IFQ>HITHENINPUT"NAME",N$ HI=Q
2005 PRINT"HI-SCORER IS NAMED     ",N$
2006 PRINT"PLAY AGAIN (Y OR N)  "
2007 GETS$ IFS$=""THEN2007
2008 IFS$="Y"THENGOTO2
2009 IFS$="N"THENPRINT"■" END
2010 GOTO2007
3000 POKE36878,15
3001 POKE36876,200 FORI=1TO100 NEXT
3002 POKE36876,0
3003 POKE36878,0 Q=0 RETURN
```

Las Vegas
by Paul Hampson

Meteor Storm

on Dragon 32

This is a version of the popular arcade game in which you must travel as far as possible through a meteor storm without crashing into a meteor. Movement is controlled by the right joystick.

The program is written entirely in machine code. To enter it, type in the machine code loader and then enter the figures either as a separate group of two, or multiples of two. S will stop the loader. It is very easy to make mistakes so be careful. Once you have finished save it immediately using Csavem "Meteorst", 13824 14680 856. Run the program using Exec 13824.

PROGRAM OF THE WEEK

```
3600: 7E 36 95 60 7C 63 7E 60 59 4F 55 60 48 49 54
360F: 60 41 60 4D 45 54 45 4F 52 6D 59 4F 55 60 41
361E: 52 45 60 44 45 41 44 04 59 4F 55 60 47 4F 54
362D: 60 54 48 52 4F 55 47 48 60 54 48 45 60 53 54
363C: 4F 52 4D 04 41 4E 4F 54 48 45 52 60 47 41 4D
364B: 45 60 66 59 6F 4E 69 60 7F 04 4D 45 54 45 4F
365A: 52 60 53 54 4F 52 4D 04 42 59 04 4D 6E 4A 45
3669: 4E 4E 49 4E 47 53 04 58 52 45 53 53 60 43 60
3678: 54 4F 60 50 4C 41 59 60 04 53 43 4F 52 45 7A
3687: 60 04 48 49 6D 04 05 60 04 CA 70 70 70 70 86
3696: 70 B7 04 19 B7 04 1A B7 04 1B B7 04 1C 86 3C
36A5: BA FF 23 B7 FF 23 8E 88 AC BF 36 BF 8E 05 6A
36B4: BF 36 BD 86 F7 B4 FF 22 B7 FF 22 BE 36 91 B6
36C3: 04 19 A7 80 B6 04 1A A7 80 B6 04 1B A7 80 B6
36D2: 04 1C A7 80 BD 8A 77 8E 04 00 86 E2 A7 89 01
36E1: E0 86 E8 A7 80 8C 04 20 26 F1 8E 04 20 86 E8
36F0: A7 84 86 E4 A7 88 1F 30 88 20 8C 05 E0 26 EF
36FF: BE 36 55 10 8E 04 69 BD 39 3E 8E 36 62 10 8E
370E: 04 AE BD 39 3E 8E 36 65 10 8E 04 EA BD 39 3E
371D: 8E 36 70 10 8E 05 A5 BD 39 3E BD 05 0A 81 43
372C: 26 F9 BD 8A 77 86 08 BA FF 22 B7 FF 22 BE 36
373B: 81 10 8E 04 00 BD 39 3E 8E 36 83 10 8E 04 0F
374A: BD 39 3E 8E 36 81 BD 39 3E 86 70 B7 04 07 B7
3759: 04 08 B7 04 09 B7 04 0A BE 36 91 A6 80 B7 04
3768: 19 A6 80 B7 04 1A A6 80 B7 04 1B A6 80 B7 04
3777: 1C CE 36 83 37 32 FE 36 BD 36 32 8E 05 DF A6
3786: 82 81 6A 26 10 E6 88 20 A7 88 20 86 60 A7 84
3795: C1 60 10 26 01 20 8C 04 80 26 E5 8E 05 E0 86
37A4: 60 A7 80 8C 06 00 26 F9 8E 36 8F 10 8E 04 20
37B3: C6 6A A6 80 81 70 2D 04 E7 A4 20 84 B6 60 A7
37C2: A4 8C 0F FF 26 06 8E 00 00 BF 36 BF 31 21 10
37D1: 8C 04 3F 26 DF BF 36 0F BD 80 12 86 01 5A 9E
37E0: 36 BD 5F 81 15 2E 09 8C 05 65 2D 32 30 1F 20
37EF: 06 81 2A 2D 2A 8C 05 60 2E 25 30 01 BF 36 0D
37FE: A6 1E 81 6A 26 02 C6 01 A6 1C 81 6A 26 02 C6
380D: 01 CE 36 83 37 32 FE 36 BD 36 32 C1 01 10 27
381C: 00 84 C6 5E 8E 35 BD 05 FF 00 81 7E 27 06 81
382B: FE 27 02 20 0E E7 88 DD 86 FF 87 FF 20 4A 26
383A: FD 87 FF 20 8E 04 40 A6 80 81 5E 26 10 E6 88
3849: DF A7 88 DF 86 50 A7 1F C1 50 27 0A 86 FF A7
3858: 86 DF 4A 81 5F 26 F0 8C 05 DF 26 DD 86 FF B7
3867: FF 20 4A 26 FD 87 FF 20 86 84 0A 4C 81 7A 27
3876: 05 87 04 0A 20 34 86 70 87 04 0A 86 04 09 4C
3885: 81 7A 27 05 87 04 03 20 22 86 70 87 04 09 86
3894: 04 08 4C 81 7A 27 05 87 04 08 20 10 86 70 87
38A3: 04 08 86 04 07 4C 81 7A 27 35 87 04 07 10 8E
38B2: 09 C4 31 3F 26 FC 16 FE C7 C1 5E 26 13 86 08
38C1: A7 98 20 87 FF 20 4C 26 F7 86 60 A7 80 20 16
38D0: FE C9 BD 39 4C 8E 36 08 10 8E 04 40 8D 39 3E
38DF: 7E 38 EF 0D 39 4C 8E 36 26 10 8E 04 40 8D 39
38EE: 3E 86 04 07 B1 04 19 2E 1E 2D 2C 86 04 08 61
38FD: 04 1A 2E 14 2D 22 86 04 09 81 04 10 2E 0A 2D
390C: 10 86 04 0A 81 04 1C 23 10 8E 04 07 10 8E 04
391B: 19 A6 80 A7 A0 8C 04 00 26 F7 8E 36 40 10 8E
392A: 04 00 BD 39 3E BD 05 0A 81 4E 27 22 81 59 10
3939: 27 FD 75 20 F1 A6 80 81 04 27 14 A7 A0 10 BF
3948: 00 00 20 F2 8E 04 20 86 60 A7 88 BC 86 00 26
3957: F9 39 7E 7E 7E 7E 7E 7E 7F FF FF FF FF FF FF
```

```
10 ' HEXADECIMAL M/C LOADER
20 CLS:S=13824
30 PRINT HEX$(S);:INPUT M$
40 IF M$="S" THEN END
50 P$=LEFT$(M$,2)
60 M$=MID$(M$,3)
70 POKE S,VAL("&H"+P$)
80 S=S+1:IF M$="" THEN 30 ELSE 50
```

Meteor Storm
by Michael Jennings

3D Maze

on Spectrum

When the program is run it displays a title with instructions. The program then computes the maze. When it has finished computing the maze it gives you the option of seeing the maze. You must try to remember the way through your maze. If you get through your score is placed in the hall of fame providing it is less than 200.

The program has a machine code subroutine to clear part of the screen so it is advisable not to test the program until you have entered the data at line 1810.

Program notes

70 129	Main loop
200 290	Print maze
300-510	Draw maze
1000-1100	Make maze
1200 1290	Move
1300 1390	Title
1400 1550	End of game
1600 1620	Draw maze (2D)
1700 1720	Display
1800-1810	Auto save and data

```
   1 REM AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
   2 POKE 23658,8
   3 RESTORE : FOR X=23760 TO 23781: READ A: POKE X,A: NEXT X
   5 BORDER 0: PAPER 0: CLS : INK 7
  10 LET TITLE=1310: LET PRINT=205: LET DRAW=310: LET MOVE=1200: LET END=1400
  20 DIM A(7): DIM B(7): DIM C(7): DIM D(7): DIM F$(4,5): DIM T(10): DIM T$(10,11): DIM M$(3)
  30 FOR G=1 TO 10: LET T(G)=200: LET T$(G)="": NEXT G
  40 LET F$(1)="SOUTH": LET F$(2)="WEST ": LET F$(3)="NORTH": LET F$(4)="EAST ": LET M$(1)=" ": LET M$(2)=CHR$ 143: LET M$(3)="E"
  50 FOR I=1 TO 7: LET A(I)=88-2*I↑2: LET B(I)=88-2*I↑2: LET C(I)=88+2*I↑2: LET D(I)=88+2*I↑2: NEXT I
  55 LET A(7)=1: LET B(7)=1: LET C(7)=175: LET D(7)=175: NEXT I
  60 GO SUB TITLE
  70 LET T=0: LET F=2: LET X=2: LET Y=2: LET M=0: CLS : GO SUB 1700
  80 GO SUB PRINT
  90 GO SUB MOVE
  95 LET T=T+1
 100 IF M<>1 THEN GO TO 80
 110 GO SUB END
 120 GO TO 70
 200 REM PRINT
 210 PRINT AT 3,26;F$(F)
 220 LET E=0: LET V=X: LET W=Y: RANDOMIZE USR 23760
 230 IF E=6 OR M(V,W)=1 THEN GO TO 270
 235 GO SUB DRAW
 240 LET V=V+(F=1)-(F=3)
 250 LET W=W+(F=2)-(F=4)
 260 GO TO 230
 270 LET E=E+1: PLOT A(E),B(E): DRAW C(E)-A(E),0: PLOT A(E),D(E): DRAW C(E)-A(E),0
 280 RETURN
 300 REM DRAW
 310 IF M(V,W)=2 THEN INK 2
 320 IF M(V,W)<>2 THEN INK 7
 390 LET G=E+1
 400 PLOT A(E),B(E): DRAW 0,D(E)-B(E)
 410 PLOT C(E),B(E): DRAW 0,D(E)-B(E)
 420 IF M(V,W-1)=1 AND F=1 OR M(V,W+1)=1 AND F=3 OR M(V+1,W)=1 AND F=2 OR M(V-1,W)=1 AND F=4 THEN GO TO 450
 430 PLOT A(E),B(E): DRAW A(G)-A(E),0: PLOT A(E),D(E): DRAW A(G)-A(E),0
 440 GO TO 460
 450 PLOT A(G),B(G): DRAW A(E)-A(G),B(E)-B(G): PLOT A(G),D(G): DRAW A(E)-A(G),D(E)-D(G)
 460 IF M(V,W+1)=1 AND F=1 OR M(V,W-1)=1 AND F=3 OR M(V-1,W)=1 AND F=2 OR M(V+1,W)=1 AND F=4 THEN GO TO 490
 470 PLOT C(E),B(E): DRAW C(G)-C(E),0: PLOT C(E),D(E): DRAW C(G)-C(E),0
 480 GO TO 500
 490 PLOT C(G),B(G): DRAW C(E)-C(G),B(E)-B(G): PLOT C(G),D(G): DRAW C(E)-C(G),D(E)-D(G)
 500 LET E=E-1
 510 RETURN
1000 REM MAKEMAZE
1010 DIM M(21,21): RANDOMIZE : FOR X=1 TO 21: LET M(X,1)=1: LET M(X,21)=1: LET M(1,X)=1: LET M(21,X)=1: NEXT X
1020 FOR X=3 TO 19 STEP 2: FOR Y=3 TO 19 STEP 2: LET M(X,Y)=1: NEXT Y: NEXT X
1030 FOR X=1 TO 70: LET M(INT (RND*17+3),INT (RND*17+3))=1: NEXT X
1040 LET G=INT (RND*12+5): LET H=INT (RND*12+8): LET E=0
1050 IF M(G+1,H)=1 THEN LET E=E+1
1060 IF M(G-1,H)=1 THEN LET E=E+1
1070 IF M(G,H-1)=1 THEN LET E=E+1
1080 IF M(G,H+1)=1 THEN LET E=E+1
1090 IF E=3 THEN LET M(G,H)=2: RETURN
1100 GO TO 1040
1200 REM MOVE
1210 LET A$=INKEY$: LET X1=X: LET Y1=Y: LET F1=F
1220 LET F=F+(A$="M")-(A$="N")
1230 IF F=0 THEN LET F=4
1240 IF F=5 THEN LET F=1
1250 IF A$="A" THEN LET X1=X1+(F=1)-(F=3): LET Y1=Y1+(F=2)-(F=4)
1255 IF A$="E" THEN LET T=300: CLS : GO SUB 1400: GO TO 70
1260 IF M(X1,Y1)<>1 OR M(X1,Y1)=2 THEN IF X1<>X OR Y1<>Y THEN LET X=X1: LET Y=Y1: GO TO 1280
1270 IF F=F1 THEN GO TO 1210
1280 IF M(X,Y)=2 THEN LET M=1
1290 RETURN
1300 REM TITLE
1310 PRINT PAPER 0; INK 6;"DMAZE 3"
1320 PRINT INK 4;"YOU ARE TRAPPED IN A MAZE. YOU MUST ESCAPE OR DIE!!''"The exit is in a cul-de-sac.";INK 5;"Use keys:"''"N>TURN LEFT"''"M>TURN RIGHT"''"A>ADVANCE"''"E>GIVE UP"
1330 GO SUB 1000
1340 PRINT FLASH 1; INK 2; PAPER 6;"DO YOU WANT TO SEE THE MAZE(Y/N)"
1350 LET A$=INKEY$
1360 IF A$="Y" THEN GO SUB 1600
1370 IF A$="" THEN GO TO 1350
1380 RETURN
1400 REM END
1410 CLS : PRINT INK 7; FLASH 1; BRIGHT 1;"CONGRATULATIONS"
1420 PRINT INK 6''"You escaped from the maze in ";T;" moves"
1430 PRINT INK 5;"HI-SCORES"
1440 INK 3: FOR X=1 TO 10: IF T(X)>T THEN FOR J=9 TO X STEP -1: LET T(J+1)=T(J): LET T$(J+1)=T$(J): NEXT J: LET T(X)=T: INPUT "Enter your name",T$(X): LET X=10
1450 NEXT X
1460 PRINT AT 7,0;: FOR X=1 TO 10: PRINT INK 2;T$(X),T(X): NEXT X
1470 PRINT INK 7; INVERSE 1;"PRESS ANY KEY TO PLAY AGAIN"
```

```
1480 PAUSE 4E4
1490 CLS   PRINT INK 7, SAME MAZ
E(),M)'
1495 IF INKEY$< -" THEN GO TO 14
95
1500 LET A$=INKEY$
1510 IF A$ " THEN PRINT   'LA
SH 1  COMPUTING MAZE   GO TO 133
0
1520 IF A$<>"Y" THEN GO TO 1600
1530 IF INKEY$<>'' THEN GO TO 15
30
1540 GO TO 1340
1550 RETURN
1600 CLS   PRINT INK 8,AT 5,28,"
N",TAB 28,"↑"  BRIGHT 1  INK 7
PRINT AT 0,0,   FOR R=1 TO 21   PR
INT TAB 5,   FOR Q=21 TO 1 STEP -
1  PRINT M$(M(R,Q)+1),   NEXT Q
PRINT   NEXT R
1610 PRINT '   PRESS ANY KEY TO C
ONTINUE   PAUSE 4E4
1620 RETURN
1700 INK 7  PRINT AT 2,25,'Facin
g
1710 PRINT AT 5,23,"Use keys",TA
B 23,"A>ADVANCE",TAB 23,"N>LEFT"
,TAB 23,'M>RIGHT',TAB 23,'E>GIVE
 IN
1720 RETURN
1800 CLEAR   SAVE "3D-MAZE" LINE
 1  VERIFY '3D-MAZE'
1810 DATA 6,192,17,10,0,33,0,64,
197,6,22,54,0,35,16,251,237,90,1
93,16,243,201
```

3D Maze
by G Richards

Attack

on Lynx

This is an all-action arcade game for the Lynx computer with ordinary memory

Program notes

90-210	Pokes graphic chr$
220-370	Main routine
380-490	Fire routine
500-690	Draws the screen
740-780	Score and makes the game faster
1100-1320	The instructions

```
10 CLS
20 PROC INSTRUCTIONS
30 REM SPACESHIP
40 PROC UDG
50 LET A=50,B=90 a=0,C=0,s=0,M=0,S=0,c=100
55 LET A$=GET$
56 CLS
60 PROC PRINT 1
70 GOTO  LABEL CONTROL
80 DEFPROC UDG
90 DPOKE GRAPHIC,NIMEM
100 FOR I=0 TO 79
110   READ A
120   POKE LETTER(128)+I,A
130 NEXT I
140 DATA 63,33,49,33,49,33,49,33,49,33
150 DATA 49,33,49,33,49,33,49,33,33,63
160 DATA 63,62,60,60,56,56,48,48,32,32
170 DATA 63,31,15,15,7,7,3,3,1,1
180 DATA 3,12,18,48,33,33,48,18,12,3
190 DATA 48,12,18,5,33,33,5,18 12,48
200 DATA 0,16,60 26,59,26,60,16,0,0
201 DATA 4,17,44,18,41,18,44,17,4,32
210 ENDPROC
220 LABEL CONTROL
230 PRINT  @ A+25,B+50;" ";
240 IF a=0 THEN  PROC PLACE
250 PROC MOVE
260 LET C=C+1
270 IF C>c THEN  GOSUB  LABEL NEXT C
280 INK 4
290 LET A=A+RAND(2)+1 MOD 78,B=B+RAND(3)
    MOD 135
300 PRINT  @ A+25,B+50;CHR$(134);
310 LET I=INP(&0480)
320 IF I=247 THEN  PROC FIRE
325 IF M>9 THEN  GOTO  LABEL END
330 GOTO 220
340 DEFPROC MOVE
350 LET I=INP(&0980),A=(A+(I=223)*2-
    (I=251)*2) MOD 78
360 LET I=INP(&0080),B=(B+(I=223)*5-
    (I=239)*5) MOD 135
370 ENDPROC
380 DEFPROC FIRE
390 INK 7
400 DOT 60 190
410 DRAW 120 120
420 DOT 180,190
430 DRAW 120,120
440 INK 0
450 DRAW 60 190
460 DOT 120,120
470 DRAW 180,190
480 INK 7
486 FOR I=1 TO 10
487   BEEP 100-I*10,50,63
489 NEXT I
489.1 IF A>=33 AND A<=36 AND B>=59 AND
    B<=69 THEN  GOSUB  LABEL BLOW
490 ENDPROC
500 DEFPROC PRINT 1
510 RESTORE 570
520 INK 2
530 FOR I=1 TO 21
540   READ A B,C
550   PLOT A B,C
560 NEXT I
570 DATA 4,10,0,2,50,50,2,195,50,2,230,0,4,
    110,0,2,120,50,2,130,0,4,120,0,2,120,
    50,4,50,50,2,50,195,2,195,195,2 195 50,4,
    120,115,2,120,110,4,120,125,2,120,122 4
    ,115,120,2,110 120,4,125,120,2 122,120
580 PRINT  @ 21,195;CHR$(18);CHR$(130);"<-
    25 SPACES ------> ";CNR$(131),CNR
    $(18);
590 PRINT  @ 10,205;CHR$(18);CHR$(130);"▲▲▲▲▲
    ",CHR$(132);CHR$(133);"▲▲"CHR$(128)
     "▲▲▲' ;CHR$(132);CHR$(133);"▲▲▲";CHR$
    (132);CHR$(133);"▲▲▲▲▲▲";CHR$(131);
    CHR$(18 );
600 PRINT  @ 15,215,CHR$(18);CHR$(130);"
    10 SPACES ";CHR$(129);" <- 18  SPACES->
    " CHR$(131);CHR$(18);
610 PRINT  @ 12,225;CHR$(18);CHR$(130);,"
    <- 31  SPACES ------------> ";CHR$(13
    1);CHR$(18),
615 PRINT  @ 30,0;"SCORE"; @ 68,0;"MISSED";
620 FOR I=1 TO 50
630   LET A=RAND(145)+50,B=RAND(140)+50,
    C=RAND(7)+1
640   INK C
650   DOT A,B
660 NEXT I
670 INK 7
680 PROTECT 2
690 ENDPROC
700 DEFPROC PLACE
710 PRINT  @ A+25,B+50,'  "
720 LET A=RAND(66),B=RAND(140),C=0,a=1
720.5 FOR Q=1 TO 2
721   FOR I=1 TO 10
722     BEEP 100-I*10,50,60
723   NEXT I
724 NEXT Q
```

```
730 ENDPROC
740 LABEL NEXT C
750 PRINT  @ A+25,B+50;"  ";
760 PROC PLACE
770 LET M=M+1 s=s+1
775 PRINT  @ 69 20;M,"  ";
780 RETURN
820 LABEL BLOW
840 FOR I=1 TO 7
845   INK I
850   PRINT  @ A+25,B+50;CHR$(134),
860   PRINT  @ A+25,B+50;" "
870   PRINT  @ A+25,B+50,CHR$(135);
880   BEEP 100,90,60
890 NEXT I
891 PRINT  @ A+25,B+50," ",
895 PROC PLACE
896 LET S=S+1,c=c-3,s=s+1
897 PRINT  @ 35,20;S,"  ";
900 RETURN
910 LABEL END
920 WINDOW 27,96,53,193
930 VDU 1,0,2,5,23
940 PRINT
950 PRINT
960 PRINT
970 PRINT
980 PRINT
1010 PRINT
1020 PRINT "GAME OVER "
1030 PRINT
1040 PRINT "PLAY AGAIN Y/N"
1041 PRINT
1042 PRINT
1043 PRINT
1044 PRINT
1045 PRINT
1045.1 LET X$=GET$
1046 WINDOW 3,123.5,245
1047 VDU 1 4 2,0,4
1048 IF X$="Y" THEN  GOTO  LABEL AGAIN
1049 PROTECT 0
1050 CLS
1060 END
1070 LABEL AGAIN
1080 LET A=50 B=90,a=0,C=0,s=0,M=0,S=0,c=100
1090 GOTO  LABEL CONTROL
1100 DEFPROC INSTRUCTIONS
1110 PROTECT 0
1120 VDU 1,3,2 0,4
1130 PRINT  TAB 15,CHR$(24);"* ATTACK *"
1140 VDU 25
1150 PRINT
1160 PRINT
1170 PRINT
1180 PRINT  TAB 2;" YOU ARE IN CONTROL OF
     THE LAST SAS"
1190 PRINT  TAB 11;"(SPACE ATTACK SHIP)"
1200 PRINT
1210 PRINT  TAB 2;"      YOU MUST CHASE AND
     DESTROY"
1220 PRINT  TAB 2
1230 PRINT  TAB 2;"ALL INVADERS
     IN SPACE BEFORE THAY"
1240 PRINT  TAB 2,"TELEPORT THROUGH TO
     ANOTHER DIMENSION"
1250 PRINT
1260 PRINT  TAB 4 "USE ARROW KEYS TO MOVE
     AND SPACE BAR TO FIRE"
1270 PRINT  "
1280 PRINT  TAB 2;"IF MORE
     THAN 10 SHIPS GET THROUGH"
1290 PRINT  TAB 2;"THE GAME ENDS"
1300 PRINT
1310 PRINT  TAB 4," PRESS ANY KEY TO CONTINUE
1320 ENDPROC
```

Attack
by A Smith

Microradio

GW6JJN

Packet radio

This week Microradio is in the news business. Well I've received a press release anyway. The press release emanates from The Tucson Amateur Packet Radio Corporation and gives details of their new Terminal Node Controller (TNC).

Packet Radio is a very, very exciting thing. Here I am, week after week, talking about micros and radio, about adapting computers to existing modes of communication like Morse and RTTY, and at last it all comes together. A mode designed for the computer, digital information that is direct and faultless, messages, even programs, that can be sent without error either round the corner or across the world, and for free. Not a penny on the phone bill. So what is packet radio?

Packet radio is a means by which you can send the information in your computer's memory to another computer in small bursts or packets. A packet can be up to 256 characters long and, like a parcel, has address information and a verification technique to make sure that the packet received is the same as the packet sent. All that is needed is a micro, a transceiver and a terminal node controller (TNC).

A TNC is an interface or circuit board which encodes and decodes the packets. If the packet isn't verified on receipt, then the TNC makes it send it again, so it is error free. It's not even vital that the computers are the same because the transmission is in binary and the TNC takes care of everything.

In a sense, the TNC is a micro in its own right. Your computer can talk to the TNC through an RS232 interface and the TNC encodes the packets and sends them off instantly. As you type on your keyboard the letters come up on your friend's screen and vice versa. You can say hello or send your latest space invaders creation. And most important of all, it's accurate and very, very fast. If your friends are not in, send the packet anyway and it will be stored for them until they want to access it.

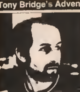
A packet can be sent through repeaters and, much more exciting, through satellites. Packet radio has been operated successfully between New York and New Zealand via satellite Oscar 10 and plans are well advanced for a new PACSAT satellite. The speed of packet radio means that you could send an adventure game in the same space of time (pardon the pun). Exciting? Who said this was the age of the train?

A TNC costs 240 dollars, details from Tucson Amateur Packet Radio Corp. PO Box 22888, Tucson, Arizona 85734, USA. No doubt it will cost £160 or more here, but it does have 30K non volatile Ram on the board and almost as much in Rom. ■

Ray Berry GW6JJN

This series of articles is designed for radio and microcomputer enthusiasts alike. If you have any queries that you want answered, hints and tips to share or topics that you would like to see covered, write to Ray Berry, Microradio, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

Tony Bridge's Adventure Corner



Adventure Quest

This week I have a query from Neil Scrimgeour who has been stuck for the past two months in Wintersoft's *Ring of Darkness* This program which has been such a success on the Dragon, has recently been released on the Spectrum

Neil has a common problem Despite completing the Dragon's sign quest and going down the labyrinth of doom becoming a level two dwarf in the process, Neil seems unable to get any more money I know how he feels

With only 150 gold pieces Neil cannot buy enough hit points or food to complete the quest What Neil wants to know is whether there is any way he can gain money easily apart from killing bandits?

Well Neil, to some extent it depends on the character you choose at the beginning of the program A thief for example can steal money or valuables to add to his wealth

As a tip to other adventurers Neil notes that it may be useful to have a bath plug when entering the aquarium in *Franklin's Tomb*

Now I am grateful to David Swain for the following reviews of *Adventure Quest* and *Snowball* from Level 9 Computing As with other Level 9 adventures, these two programs are available on BBC Commodore 64, Spectrum, Lynx Nascom, Oric and Atari

Adventure Quest is the second adventure in the *Middle Earth Trilogy* from level 9 computing and carries on from *Colossal* an adventure about which much has been written You are an apprentice magician and because all others seem to have failed you are given the chance to try and defeat the demon lord Agaliarept who resides in the dark tower

The object of this adventure is firstly to search for and find the four stones, no mean feat in itself, and secondly to use these stones to enter the dark tower Finally, you must defeat the demon lord by means of magic and a helpful companion

Here we have an adventure with just about everything You start outside a small brick building surrounded by forest, travel through swamps — ward off savage wolves — find cunningly hidden objects, then proceed if you dare, across a dry arid desert But, keep a wary eye for the giant sand worm, whose powers are mightier than the sphinx Use its great powers "if you know how climb mountain ranges to defeat giants and orcs in their castle — slip into dark caves and tumble into roaring underground torrents

If you can open the rusted door, enter the vast cavern to fight off more orcs, giant spiders and dragons and then dare to enter a fire licking erupting volcano Find your way through a swamp avoiding grasping skeletal hands, Will O wisps and vampires, to the very shadow of the dark tower

Work out the combination for the locks and enter the demon lord's dark tower and if you can defeat him claim the title Grand Master Adventurer

This has always been one of the best adventures for me as it seems to contain the lot In all it took me about eight months to solve It has the usual *Save/Restore* facility and you do have three lives before you have to start all over again As with *Colossal* there is a puff of smoke and you find yourself elsewhere not always to advantage

A good little booklet setting the scene comes with the cassette and an envelope and hint token should you become hopelessly stuck

Snowball 9 is the first adventure in the new *Silicon Dream Trilogy* Here again we have all the expertise we have come to expect from Level 9 Computing — this adventure has over 7 000 locations

Snowball 9 is a colony starship launched in the 2190s from the EEC's Ceres Base with thousands of colonists on board Something has gone wrong and it is up to you, as Kim Kimberley, to rescue *Snowball 9* from disaster

You are lying in a freezer coffin in total darkness always a good one for openers Extricate yourself from this and you find that you are in a mortuary Travel a few paces and find that you are almost trapped in a vast cylindrical complex of many mortuaries — about 2 000 I believe I didn't have time to visit them all, though I am sure you could So the sooner you learn the colour light booing system the sooner doors begin to open into other parts of this vast starship

The appeal of this adventure to me is the distinct lack of monsters — there are really only two slightly nasty guardians the nightingale to be avoided at all costs and the rather stubborn waldroid This does allow you to concentrate fully on how you are going to perform the various tasks

In all about 40 objects have to be found and used, but you can only carry about four at a time You must adventure out into darkest space, across snowfields in shuttles and recreation areas where there are forests and snake pits, or are there? And on and on to Snowball's central control room and hopefully final success.

An absorbing adventure giving I think a good few hours of pleasure My one reservation being that too much detail is built into the earlier parts of this adventure at the expense of the closing stages where lack of detail and problems makes the final rescue too simple and an mas However I am now looking forward to party two of the trilogy *Return to Eden* ■

Are you stuck in an adventure? Are you faced by a problem that seems insurmountable? *Adventure Helpline* may be the answer

Adventure Helpline is quite simply designed to put adventurers in touch with one another Where you may be stumped by a baffling puzzle a fellow adventurer may be able to help By the same token you may be able to help other people with their problems

If you are having difficulties with an adventure fill in the accompanying coupon and send it to

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This series of articles is designed for novice and experienced Adventurers alike Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter So if you have an Adventure you want reviewed or if you are stuck in an Adventure and cannot progress any further, write to Tony Bridge, Adventure Corner *Popular Computing Weekly* 12 13 Little Newport Street London WC2R 3LD



WHITE ON BLACK

M Henderson of Great Eastern Street Cambridge writes

Q I have recently bought a ZX81, just to see how I and new technology mix. I have done the various tuning tricks to get a good screen picture, and I can now get an adequate display.

However, a friend says that somewhere she has seen an advertisement for a module that will improve the quality of the screen picture by reversing the black and white. Is this true and, if so, can you give me any details about it?

A I think you are describing the Fritch inverse video module This gives a very good inverse display that is usually much clearer than the normal picture It is available from D Fritch 6 Stanton Road, Thelwall, Cheshire WA4 2SE The cost is £7 50 if they fit it for you, or £4 00 if they send you a kit

VIDEO SIGNALS

Y Henderson of St Ives Huntingdon, Cambridgeshire writes

Q I have an Atari home computer, but recently I have become more interested in making home videos As the magnetic tape is the same, is there anyway that I could record computer graphics and text on to my video films?

A Yes it is possible But I do not know of any system commercially available for the home computer market

What you need is a video mixing unit This will allow you to mix more than one video signal on to a single tape It then sends the mixed signal to the modulator for display on a screen Although it may sound the same as sound mixing, and the theory is approximately the same, the greater amount of information that needs to be stored for a television picture makes it correspondingly more complex

DIRECT COMMAND

Paul Gurney of Hereford Road Hereford writes

Q I have a 16K Spectrum and on page 16 of the manual it says that if you enter as a direct command *Clear 23800* it will give you an idea of what happens when the memory becomes full All I get when I do this is *M Ramtop no good*. This happens even when I switch on and enter this at once. Is this meant to happen, or have I got something wrong with my Spectrum?

Also, can you tell me how to use both *Attr* and *Screen$* on my Spectrum as I do not understand them from the manual? How do you use *Screen$* to find out what is printed at a certain position on the screen?

A To answer the second part of your question first, *Screen$* is a command not well documented in the otherwise excellent Sinclair manual, which would have you believe it is only useful for saving pictures onto tape In fact, the format *Print Screen$ (y,x)* means print the character found at line *y*, column *x* You can use this to determine events according to a given screen position by using a line like *If Screen$ (15 20) = "A" Then Print "Bang"* The problem is, though, that *Screen$* can't recognise user defined characters, so in practice you won't find much use for it in games

Instead you should use *Attr* which reads a value at a given point on the screen — that value depends on the colour of the square and whether it is flashing or not — look in the manual for the exact formula you need If, for example, you have a green flashing alien and you need to know if he has reached a particular point on the screen, you would find out the *Attr* value for green flashing and have a line like *If Attr (x y) = (value for green flashing) Then*

The *Clear* command is simpler to explain The memory of the computer has been assigned to different tasks and is divided up accordingly Normally, there is a certain amount of room for Basic programs Supposing though, you need more room and your program does not require any user defined graphics — by moving Ramtop up in memory you will give yourself that room by overwriting the section usually reserved for user defined graphics

By typing *Clear 23800* you are deliberately allowing yourself no space for Basic whatsoever and thus you get the response *Ramtop no good* It has been moved too far down

BASIC COMPILER

Douglas Lockhard of Elie Place Barnhill Broughty Ferry Dundee writes

Q My Dad and I have decided to buy a ZX Spectrum I am aware that it is still early days yet, but I was wondering if you knew of a Basic compiler that was available for the Spectrum (the thought of being able to write programs in Basic, and then have them converted to machine code, seems very inviting)? If you do not know of one, could you please write out, or explain how to write, a compiler?

A The idea of a compiler is very attractive — instant machine code at the touch of a button! But it s not as simple as it sounds Some Basic commands cannot be compiled, some types of dimensioned strings for example The end result may have the speed of machine code but it will usually take up a lot more memory than a program written in code from the start

What a compiler will do is speed up most, straightforward, arcade type games thus making them more exciting and competitive than the often plodding results you get from ordinary Basic

Fortunately there are a couple of commercial compilers available so I don t have to spend the next 27 Peek and Pokes explaining how to write one! The two I know of are *Softek FP Basic Compiler* £19 95, Softek 329 Croxted Road, London SE24 and *M Coder*, £9 95 from PSS 452 Stoney Stanton Road, Coventry CV6 5DG Softek also do a stripped down version of the above compiler for £9 95

STARRY NIGHT

Colin Langveld of Lisholme Road Liverpool writes

Q I would be obliged if you can help with what must be a very simple matter. I have a space ship, (value *X*) trying to make a planet fall, with the sky full of stars The trouble is that as the ship descends it wipes out the stars I know that the answer is to *Peek*, but how do I use this command on my Vic20? Perhaps its my age They say that by the time you reach 40 you lose *X* bytes every day.

A The answer to your problem is simple if a bit cumbersome You are quite right in assuming that a *Peek* is the answer I guess you are using the full stop for your stars, which have an Ascii code of 46 What you need to do is *Peek* the appropriate screen location and see if it has a value of 46, ie, if a star (full stop) can be found there

To prevent the ship 'rubbing out' stars use a variable to record the position of the ship and look at the screen location 22 spaces further on, ie the next square *Peek* this square to see if it contains 46 (a star) Now you need to store this fact by recording the screen address using a variable So *If Peek* (the memory address of the square 22 on from the ship) = *46 Then Let x* = (the address above) As soon as your ship has moved past the square *Poke x* with 46 and you have your star back

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can The address is *Peek & Poke, PCW*, 12-13 Little Newport Street, London WC2R 3LD.

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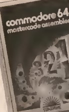
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Mastercode Assembler

for the Commodore 64

Full Commodore 64 Assembler/Disassembler



£14.95 inc VAT

Mastercode is a substantial and complex program of use to anyone interested in writing machine code on the Commodore 64. Its features include:

- ☐ Machinecode monitor
- ☐ File Editor
- ☐ Disassembler
- ☐ Assembler

Mastercode is a full two pass assembler. It accepts labels, variables and equations within assembly language programs. It is possible to store programs anywhere in memory, even in parts occupied by the Assembler. Programs can be saved to either tape or disc

The Machine Code Monitor includes:

■ OUTPUT OF MEMORY TO SCREEN OR PRINTER ■ MODIFICATION OF MEMORY ■ EXECUTION OF MACHINE CODE PROGRAMS ■ SAVING OF MACHINE CODE FILES ON TO TAPE OR DISC ■ LOADING OF MACHINE CODE FILES FROM TAPE OR DISC ■ STEP BY STEP TRACING OF THE EXECUTION OF A MACHINE CODE PROGRAM INCLUDING DISPLAY OF REGISTER CONTENTS

The Disassembler will translate into assembly language the contents of any area of memory, whether the 64's ROM or a user program. Output may be sent either to the screen or a printer

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SMALL DOT



3D Seiddab Attack is one of the most impressive 3D programs I've seen yet on the Spectrum and there are quite a few of them

In this you are behind the wheel of a Drone — a super modern tank patrolling the city streets This involves watching your radar screen for the appearance of the small dot that denotes the presence of a Seiddab — chase it until it comes into view and then well, you can guess can t you?

If you succeed in clearing the first screen, you are then transported to the countryside outside the city where you make a much easier target for the unpleasant machines

The screen display is great showing the front of your tank as you move it round the city streets and the radar and range-finder displays for locating the enemy — it s very well done

Program *3D Seiddab Attack*
Price *£5 95*
Micro *Spectrum 48K*
Supplier *Hewson Consultants*
60A St Mary s Street
Wallingford
Oxon OX10 0EL

EVIL WITCH

Epic is a new software house catering for those BBC owners who want to test their intellectual mettle on the kind of vast text adventures more commonly associated with mainframes and more recently the Spectrum computers

The company currently has three 32K adventures available *Castle Frankenstein*, *The Quest for the Holy Grail* and *The Kingdom of Klein*

In the last of these, your quest is to return the stolen magic Klein Bottle — anyone foolish enough to attempt to recover it has been promised hideous retribution from an evil witch

Can you defy the curse and solve the mystical properties of the five solids (whatever that means) in order to kill the witch? All the games in the series have around 230 locations and are machine coded for fast response times

Program *The Kingdom of Klein*
Price *£8 45*
Micro *BBC (32K)*
Supplier *Epic Software*
10 Gladstone Street
Kibworth Beauchamp
Leicester LE8 0HL

KAMIKAZE

Now for the Electron comes *Birds of Prey* a version of *Phoenix* that retains most of the features of the original

True to Alfred Hitchcock s awesome predictions the birds have gone on the offensive (and in space at that) They are attacking your (here s a post-Christmas puzzle for you — fill in the missing letters) *lo-e l-s-r b--e* which is all that stands between the birds and something very nasty indeed

The birds first of all attack in formation, when they are relatively easy to shoot But later birds attempt kamikaze runs directly on your base which you will find difficult to avoid A good implementation of one of the classic arcade games

Program *Birds of Prey*
Price *£6 99*
Micro *Electron*
Supplier *Romik Software*
272 Argyll Avenue
Slough
Berks

RED ARMY

Wilfred the Hairy Olaf the Hungry is the surprising title of a strategy game in which you try to take over the world Well, you have to start somewhere

Wilfred and Olaf are represented respectively by blue and red armies which are moved by cursor keys You must fight battles making sure that you are well supplied with ammunition — should you run out you'll have to return to your home castle

The computer plays for the red army and is equally concerned with maximising its territory without overstretching its resources Microbyte who manufactures the game is stressing its tactical elements — don t expect any easy victories

Program *Wilfred the Hairy Olaf the Hungry*
Price *£5 95*
Micro *Spectrum*
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19 Worcester Close
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Staffordshire

CAMELS REVENGE

Maintaining some sort of dromedary karmic balance, Jeff Minter llama-obsessed mastermind behind Llamasoft has decided to issue *Revenge of the Mutant Camels* a follow up to *Attack of the Mutant Camels*

I will not attempt to paraphrase the cassette blurb which explains the history of the mysterious camels and the events of the game, suffice to say that it is very funny and I am pleased to announce that now the camels are on our side

Using the joystick you must pit your camel against some of the most bizarre adversaries ever seen in an arcade game, including goats kangaroos on skis and telephone boxes The graphics are superb

As a final point of interest the game incorporates a new loading system which will function on good quality tape systems and load the game in under two minutes instead of the usual 15 minutes

Program *Revenge of the Mutant Camels*
Price *£7 50*
Micro *CBM 64*
Supplier *Llamasoft Software*
49 Mount Pleasant
Tadley
Herts

IN KEY

Dancing Feats is another music program for the Commodore 64 — given the computer s music making capabilities, it hardly comes as much of a surprise there are so many

This looks to be one of the simplest to use — the only thing you have to master is the joystick which you use to play the notes The computer will keep you in key and the fire button lets you change the octave

Aside from this, you can choose the kind of bass effect you want and other features like style and tempo Finally you can record and playback your masterpieces.

Program *Dancing Feats*
Price *£5 95*
Micro *Commodore 64*
Supplier *Artic Computing*
Main Street
Brandesburton
Driffield YO25 8RL

AIR COMBAT

Digital Integration are not backward in coming forward — the blurb for *Fighter Pilot* contains a long list of reasons why its *Flight Simulation* for the Spectrum is better than

that other well known *Flight Simulation* — the one by Psion

Pretty convincing the claims are too backed up by some screen photographs showing the runway approach In this simulation you are piloting a jet fighter and can practice landing take off combat air to air combat, etc

With all simulations, you need to spend a lot of time before a sound judgement can be made, but I think this one really does live up to its claims — the 3D views of the runway approach in particular are most impressive

Program *Fighter Pilot*
Price *£7 95*
Micro *Spectrum 48K*
Supplier *Digital Integration, 22 Ash Church Road, Ash, Aldershot, Hants GU12 6LX*

BBC SPRITES

THE SPRITE MASTER

BBC MODEL B

The BBC has wonderful graphics but it does not have sprites — those extremely useful objects that enable you to create convincing and smooth movement

The *Sprite Master* gives you the facility to create multi-coloured sprites on your BBC which can be moved anywhere on the screen Up to 32 may be used simultaneously

Each sprite can be assigned one of 16 characters and you can use any of the graphics modes Each one is 100 graphic points square, although it is easy to create a smaller shape simply by leaving edges blank

The program comes with some demonstration programs and relatively simple instructions

Program *Sprite Master*
Price *£9 95*
Micro *BBC B*
Supplier *Micro Dealer UK, 3 Station Crescent, Westcombe Park, Blackheath, London SE3*

SCORECARD

Junior Wordsplits is one of Sulis Software's educational packages for the BBC B

The program is aimed at the 8 to 11-year-old age group and it is all to do with recognising words in order to spell them properly

The computer has a vocabulary of more than 500 words and the words appear in a different way and in a different order each time The program comes with a scorecard so you can keep track of your child's progress

Program *Junior Word Splits*
Price *£9 95*
Micro *BBC B*
Supplier *Sulis Software, Baffins Lane, Chichester, Sussex PO19 1UD*

BUSINESS RECORD

As soon as the Microdrive becomes reliable there are going to be a lot of small businesses finding uses for their Spectrums which they never suspected

Transform has versions of *Purchase Day Book* and *Sales Day Book* on the B side of the cassettes which you can save to Microdrive

The programs themselves are concerned with the day-to-day running of a shop or other business, keeping records of cheque payments with *Purchase Book* and keeping track of invoices with *Sales Day Book*

Both programs come with instructions on their use and information can be printed out to both ZX and full size printers

Program *Sales/Purchase Day Book*
Price *£10 75 (each)*
Micro *Spectrum*
Supplier *Transform, 41 Keats House, Porchester Mead, Beckenham, Kent*

BOVVER TEDS

More disillusionment in the bear department I'm afraid — some of you may remember my horror when I discovered that in *Teddy* by Supersoft, bears ate snakes Now they are getting violent

Bear Bovver is the latest game from Artic and it depicts bovver bears — brusque nasty fellows who chase you all over a maze of ladders as you try to get at some batteries for your car (it conks out every few yards without a new one)

The bears are beautifully done, using large animated sprite effects as they climb up and down the maze of ladders trying to prevent you from getting to your batteries One of the best yet from Artic

Program *Bear Bovver*
Price *£5 95*
Micro *Spectrum*
Supplier *Artic Computing, Main Street, Brandesburton, Driffield YO25 8RL*

ROGER 1

Ever fancied sitting in the control tower saying things like "Roger 2 Victor Zero vector on two three seven"? No, neither have I

But you might change your mind should you buy *Air Traffic Control* by Microdeal — a program available for both Dragon 32 and BBC

You must take charge of a number of RPVs (Remotely Piloted Vehicles) and ensure that they don't crash whilst you guide each one to a safe and secure landing

There are various graphic displays showing the position of the various aircraft and the runway when you are attempting a landing The program also allows you to take off and perform various other manoeuvres

Program *Air Traffic Control*
Price *£8*
Micro *Dragon 32/BBC*
Supplier *Microdeal, 41 Truro Road, St Austell, Cornwall PL25 5JE*

TEE OFF

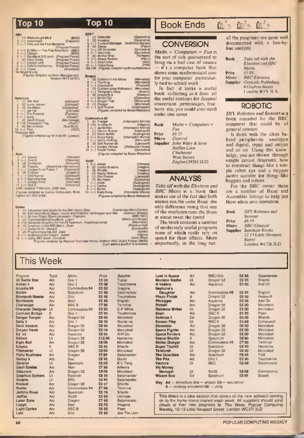
Golf simulations abound but *Royal Birkdale* is the first I've seen to be based on an actual golf course — the game even has the approval of the club

The author created the program from an actual plan of the course Unlike some of the early golf game efforts, this seems to have benefited from the need for ever better graphics with the advent of the likes of Ultimate — consequently, when you tee off you actually see a little man swinging his club

It has all the usual features of computer golf — you choose the club taking into account wind speed and direction, and the computer keeps score

Program *Royal Birkdale*
Price *£6 90*
Micro *Spectrum*
Supplier *Ocean Software, Ralli Building, Stanley Street, Manchester M3 5FD*

New Releases is designed to let people know what software is coming on to the market If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases Popular Computing Weekly 12-13 Little Newport Street London WC2R 3LD



Top 10

BBC

1 (1) White Knight Mk 2 (BBC)
2 (—) Hunchback (Superior)
3 (—) Felix and the Fruit Monsters (Program Power)
4 (—) Dr Who — The First Adventure (BBC)
5 (—) Canyon (BBC)
6 (—) Bandits at 3 O'clock (Program Power)
7 (3) Killer Gorilla (Program Power)
8 (—) Danger UXB (Program Power)
9 (—) Felix in the Factory (Program Power)
10 (—) Chess (Acornsoft)

All Model B only

(Figures compiled by Micro Management, Ipswich 0473 59181)

Spectrum

1 (1) Atic Atac (Ultimate)*
2 (2) Lunar Jetman (Ultimate)
3 (3) Ant Attack (Quicksilva)
4 (—) Jet Pac (Ultimate)
5 (—) The Pyramid (Fantasy)
6 (—) Kong (Ocean)
7 (6) Death Chase (Micromega)
8 (10) Chequered Flag (Psion)*
9 (4) Manic Miner (Bug-Byte)
10 (—) Fool (CDS)

*Requires 48K.

(Figures compiled by W H Smith, London)

Atari

1 (1) Zaxxon (Datasoft)
2 (—) Zork III (Infocom)‡
3 (5) Enchanter (Infocom)‡
4 (8) Preppie (Adventure International)
5 (—) Escape From Pulsar 7 (Channel 8)
6 (8) Firefleet (English)†
7 (—) Grid Runner (Llamasoft)
8 (—) Spy's Demise (Penguin)‡
9 (—) Savage Pond (Starcade)
10 (—) Zork II (Infocom)‡

†32K cassette *16K disc. ‡36K disc.

(Figures compiled by Central Computers, Beckingham 061-832 6458)

ZX81*

1 (7) Defender (Quicksilva)
2 (2) Invaders (Quicksilva)
3 (—) Football Manager (Addictive Games)
4 (3) Chess (Psion)
5 (—) QS Scramble (Quicksilva)
6 (—) Asteroids (Quicksilva)
7 (6) Mother Ship (Softsync)
8 (—) Space Raiders (Psion)
9 (—) Inca Curse (Artic)
10 (—) Crazy Kong (PSS)

*All 16K (Figures compiled by Boots/Websters)

Dragon

1 (2) Cuthbert in the Mines (Microdeal)
2 (—) The King (Microdeal)
3 (—) Champions (Peaksoft)
4 (3) Cuthbert goes Walkabout (Microdeal)
5 (—) Pettigrew's Diary (Shards)
6 (6) Dragonfly 2 (Hewson)
7 (—) Mined Out (Quicksilva)
8 (—) Dragon Trek (Wintersoft)
9 (1) Frogger (Microdeal)
10 (—) Grid Runner (Salamander)

(Figures compiled by Boots/Websters)

Commodore 64

1 (8) Frogger (Interceptor Micros)
2 (10) Arcadia 64 (Imagine)
3 (—) Sprite Man (Interceptor Micros)
4 (1) Hover Bovver (Llamasoft)
5 (7) Motor Mania (Audiogenic)
6 (—) Krazy Kong (Interceptor Micros)
7 (—) Quick thinking (Mirrorsoft)
8 (8) Grid Runner 64 (Llamasoft)
9 (—) Hungry Horace (Melbourne House)
10 (—) Purple Turtles (Quicksilva)

(Figures compiled by Boots/Websters)

Vic20

1 (—) Jetpac (Ultimate)
2 (2) Catcha Snatcha (Imagine)
3 (3) Arcadia (Imagine)
4 (4) Wacky Waiters (Imagine)
5 (1) Grid Runner (Llamasoft)
6 (7) Sky Hawk (Quicksilva)
7 (—) Amok (Audiogenic)
8 (—) Cactus (Audiogenic)
9 (—) Bonzo (Audiogenic)
10 (—) Krazy Kong (Interceptor Micros)

(Figures compiled by Boots/Websters)

Books

1 (1) Advanced User Guide for the BBC Micro *Bray* (Cambridge Micro Centre)
2 (6) BBC Micro Book: Basic, Sound and Graphics *McGregor and Watt* (Addison Wesley)
3 (—) 30-hour Basic, Spectrum version *Prigmore* (BBC NEC)
4 (2) Spectrum Microdrive Book *Logan* (Melbourne House)
5 (10) Advanced Graphics for the ZX Spectrum *Angell and Jones* (Macmillan)
6 (4) Graphics on the BBC Micro *Cryer* (Prentice-Hall)
7 (—) Using the 64 *Gerrard* (Duckworth)
8 (8) Programming the Z80 *Zaks* (Sybex)
9 (—) Anatomy of the Dragon *James* (Sigma)
10 (—) Using BBC Basic *Cockerell* (John Wiley)

(Figures compiled by Watford Technical Books, Watford 0923 23324, Prestel 28844)

(Last week's position in brackets)

Book Ends

CONVERSION

Maths + Computers = Fun is the sort of title guaranteed to bring on a bad case of nausea — it's a computer book that shows some mathematical uses for your computer particularly tied to school work

In fact it looks a useful book collecting as it does all the useful routines for decimal conversion percentages, fractions etc, you could ever need under one cover

Book *Maths + Computers = Fun*
Price *£6 25*
Micro *General*
Supplier *John Wiley & Sons, Baffins Lane, Chichester, West Sussex, England PO19 1UD*

ANALYSIS

Take off with the Electron and BBC Micro is a book that makes use of the fact that both micros run the same Basic the only difference being that one of the machines runs the Basic at about twice the speed

The book contains a number of moderately useful programs none of which really rely on speed for their effects. More importantly, in the long run all the programs are quite well documented with a line-by-line analysis

Book *Take off with the Electron and BBC Micro*
Price *£5 95*
Micro *BBC/Electron*
Supplier *Granada Publishing, 8 Grafton Street, London W1X 3LA*

ROBOTIC

DIY Robotics and Sensors is a book intended for the BBC computer that could be of general interest

It deals with the ideas behind peripherals analogue and digital, input and output and so on. Using this knowledge, you are shown through simple circuit diagrams, how to construct things like a simple robot eye and a stepper motor suitable for things like buggies and robots

For the BBC owner there are a number of Basic and Assembler listings to help put these ideas into operation.

Book *DIY Robotics and Sensors*
Price *£6 95*
Micro *BBC/General*
Supplier *Sunshine Books, 12 13 Little Newport Street, London WC2R 3LD*

This Week

Program	Type	Micro	Price	Supplier
3D Battle Star	Arc	Oric 1	£9 50	Topaz
Action 5	Arc	Oric 1	£5 90	Touchstone
Arcadia 64	Arc	Commodore 64	£5.50	Imagine
Bimbo	Arc	Spectrum	£5 95	Salamander
Blowtorch Blaster	Arc	Oric	£5 95	Touchstone
Bombastic	Arc	Atari	£5 95	English
Challenger	Arc	BBC B	£7 95	Terminal
Character Designer	Ut	Commodore 64	£5 00	C P White
Contract Bridge	S	Oric 1	£5 00	Touchstone
Danger Ranger	Arc	Dragon 32	£8 00	Microdeal
Delta 4	Arc	Oric 1	£8 95	Nectarine
Devil Assault	Arc	Dragon 32	£8 00	Microdeal
Dragon Hawk	Arc	Dragon 32	£8 00	Microdeal
Ed on	Arc	Aquarius	£8 95	Add On
Editext	Ut	Dragon 32	£12.95	Nectarine
Eight Ball	Arc	Dragon 32	£8 00	Microdeal
Empire	S	BBC B	£8 95	Shards
Filemaster	Ut	Dragon 32	£8 00	Microdeal
Fishy Business	Ad	Dragon	£7 95	Salamander
Galaxy 5	Arc	Oric	£8 95	Durell
Genplot	Ut	Spectrum	£8 00	K C Tang
Giant Blaster	Arc	Atari	£7 95	Artworx
Glaxxons	Arc	Dragon 32	£8 00	Microdeal
Graphics System	Ut	Electron	£9 95	Salamander
Graphs	Ut	BBC	£9 95	Salamander
Hooked	Arc	Dragon 32	£8 57	Shards
Hunter	Arc	Commodore 64	£7 95	Terminal
Jericho Road	Arc	Spectrum	£5 75	Shards
JetPac	Arc	Vic20	£5 50	Ultimate
Laser Zone	Arc	Dragon	£7 95	Salamander
Leggit	Arc	Atari	£5.50	Imagine
Light Cycles	Arc	BBC B	£8 95	Pean
Loki	Arc	Oric	£8 45	Joe The Lion
Lost In Space	Ad	BBC/Oric	£9 95	Salamander
Monster Maths	Ut	Dragon 32	£8 95	Shards
N Vaders	Arc	Aquarius	£5 95	Add On
Neptune's Daughter	Arc	Commodore 64	£8 95	English
Photo Finish	S	Dragon 32	£8 95	Peaksoft
Phrogger	Arc	Aquarius	£5 95	Add On
Pinball	Arc	Dragon 32	£8 00	Microdeal
Rainbow Writer	Ut	Dragon 32	£9 00	Microdeal
Sean	Arc	BBC B	£5 95	Pean
Science 1	Ed	Dragon 32	£6.95	Shards
Screen Play	Ut	BBC B	£4.95	Compusell
Skramble	Arc	Dragon 32	£8 00	Microdeal
Space Fighter	Arc	Dragon 32	£8 00	Microdeal
Space Raiders	Arc	Dragon 32	£8 00	Microdeal
Space Shuttle	S	Spectrum	£8 00	Microdeal
Stellar Dodger	Arc	Commodore 64	£7 95	Terminal
Super Toolkit	Ut	Spectrum	£8 95	Nectarine
Telefarsh	Ut	Dragon 32	£8 00	Microdeal
The Guardian	Arc	Spectrum	£5.95	PSS
The Pits	Ad	Oric 1	£5 00	Touchstone
Vectors	Ut	BBC	£9.95	Salamander
Vic Money Manager	Ut	Vic20	£8 95	Commodore
Wizard Box	Ed	Spectrum	£8 95	Scisoft

Key Ad — adventure Arc — arcade Ed — education/ S — strategy simulation Ut — utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to This Week, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD



Kettle of fish

In this final part of the particular blint on Ziggurat I want to briefly examine a couple of more obscure languages

Smalltalk enjoyed a brief period of fame when the Apple Lisa was introduced Many people get confused between the Smalltalk programming environment as implemented on the Xerox Star, and the language itself The environment is obviously pretty useful

However the language itself without getting too deeply involved is a very odd kettle of trout As I understand it Smalltalk stores everything in the same way the symbol for the thing the operations that may be carried out on the thing and so on Thus, numbers are stored in this way, and may be added subtracted etc. So are the symbols for addition multiplication and division, etc

The designers have tried to make the language as uniform as possible Thus, there are very few concepts to learn for Smalltalk because the same concepts apply to everything The end result is undoubtably elegant but it suffers from not taking our intuition into account Everyone who reaches an advanced state in programming knows the difference between operators functions and statements, and does not need the process simplified

I am not implying that Smalltalk is hopeless just that it is near the start of a road towards a genuinely useful new concept in languages

Probably the single most important language not yet mentioned is assembly language A modern assembler such as Macro-86 on the 8088/6 comes very close to being a high-level language I particularly like the rich variety of addressing modes available in assembly languages — even the humble 6502 has some extremely powerful if under implemented modes Many of these modes can be realised through the use of indirection operators Many readers will be familiar with the $! and ? of BBC Basic but this is only the beginning I should like to see another operator that implements stacks I propose stacks be defined with a line like

```
VAR BLOCKS STACK 500 INTEGER
```

This could define a stack that holds up to 500 integers A symodl could then be used to push and pop numbers as follows

```
]BLOCKS=23
PRINT [BLOCKS
```

A right hand square bracket puts a number on to the stack and a left hand one removes the number Another symbol or both symbols combined could then be used to examine the top element of the stack without removing it It would be useful to be able to implement indirection in variable names (this will only operate in an interpreted environment) For example

```
VAR NAME STRING 10?
    WOW INTEGER
    BEGIN
    NAME= WOW
    PRINT @NAME
    END
```

I have assigned the @ symbol for indirection It is followed by a string variable which contains the actual name of the variable to be used One could then write lines like *Print @@@@@@@@@@@@@NAME*, which would be guaranteed to irritate everybody

Stacks are useful in many applications mainly graphics and languages but indirected variable names are of more limited use so I cannot seriously propose them Of course they are a type of addressing mode too, as are stacks (on the 68000 at least)

The computer that is going to run our ideal language will be 16 bit It will have at least 128K of Ram and some form of mass storage so all the ideas I have discussed are quite possible

The real point of this series is that despite the great ease with which we have discussed a feasible useful powerful language it will not be adopted Instead, manufacturers will be sending computers limping on to the market place with Microsoft Basic and Sinclair Basic — *even* BBC Basic. ■

Jeremy Ruston

Puzzle

Digital letters

Puzzle No 89

Here is an alphametic number puzzle in which the idea is to substitute digits for the letters in the following multiplication sum

DAYS x 7 = WEEK

As is usual with problems of this kind each different letter stands for a different digit and the same letter always represents the same digit.

How many solutions can you find?

Solution to Puzzle No 84

The program generates the prime numbers from 11 to 99 and can then be modified to determine if larger numbers are prime

```
10 FOR N = 11 TO 99 STEP 2 20 FOR F = 3 TO (SQR N) + 1 STEP 2 30 LET X = N/F 40 IF X = INT X THEN GOTO 70 50 NEXT F 60 PRINT N 70 NEXT N
```

Of the primes between 11 and 99 all those containing either an even digit or a nine can be ruled out Each of the remaining numbers should be paired so that the last digit of the first prime matches the first digit of the second This will result in a list of three digit numbers Each of these should then be tested by modifying the program to check each number to see if it is prime Any composites on the list can be crossed off For example the first prime 11 can be paired with 11 13, or 17 to form 111 113, and 117 Of these both 111 and 117 can be eliminated as being non-prime

This procedure can be continued with the new list of three-digit numbers by tagging on further two-digit primes Each of these new four-digit numbers should be tested in the same way Each time composite numbers can be removed from the list

The procedure is then continued until all but one number is eliminated

This final number is the answer 31373 Every digit pair of digits three consecutive digits and four consecutive digits are prime numbers

Winner of Puzzle No 84

The winner is Dave Jones York Close Beckton, London who receives £10





"PI EYED" (48K SPECTRUM) The comedy arcade game. Just voted 'PROGRAM OF THE YEAR' starring The PIMAN, with FREE RECORD!
"PIMANIA" "The best adventure game ever reviewed"
48K SPECTRUM £10
DRAGON 32
16K ZX 81 £5
"GO TO JAIL" (48K SPECTRUM)
"YAKZEE" (DRAGON 32 and 48K SPECTRUM)
CARD NUMBER
MY SIGNATURE
MY NAME
MY ADDRESS
POST CODE
AUTOMATA U K LTD
27 HIGHLAND ROAD
PORTSMOUTH HANTS
PO4 9DA ENGLAND
24-hour mail-order service
Telephone (0705) 735242
THE PIMAN HAS BEEN ON THE SKIDS FOR OVER A WEEK, AND HIS FRIENDS CAN NO LONGER CONCEAL THEIR ANXIETY...
DID HE TELEPHONE WHILE I WAS OUT?
WHO?
YOU KNOW WHO! AND LOOK AT THIS PAPER!
DAILY Panic
PIMAN BOPS STAR
FILM ACTRESS, SUE WILLS, WILL SUE.
Complete Idiot-Box Guide
I'M SURE THE LITTLE SCHMUCK CAN LOOK AFTER HIMSELF!
OH, UNCLE GROUCHO! HOW CAN YOU TALK THAT WAY?
I PUT THAT DOWN TO THE TOWN WHERE I WAS RAISED!
VERY-SNIFF-FUNNY! IT SEEMS HE NEVER-SNIFF HAD ANY REAL FRIENDS — SOB!
RRING RRRING RRING RRRIIINGG
AHA THAT'LL BE THE TELEPHONE!
SNIFF - HELLO? YEAH YEAH SNIFF YEAH, THAT'S RIGHT
PARDON? REALLY? OH THAT YES, THAT WOULD BE NICE OF YOU! LET ME KNOW THE MINUTE YOU HAVE ANY LUCK! THANKS - 'BYE!
WHO WAS IT?
THE INMATES OF THE PIMANIA INSTITUTE ARE ALL PLAYING 'PI-EYED' ON THEIR RUBBER COMPUTERS TO HELP PIMAN GET IT BACK TOGETHER
OH BOY! I'D GET MY VIOLIN BUT CROUCHER DOESN'T ALLOW VIOLINS
THAT PUN WAS BROUGHT TO YOU BY INTERPUN, AT GREAT EXPENSE! NOW BACK TO THE CARTOON AND IN A GROTTY BACK ALLEY SOMEWHERE
SKID ROW
ON MUVVER KELLY'S SPE-E-ECTRUM-
ERE, OO SH THAT?!
OO SH THAT?
WHOOPS!
AT LASHT THE GREAT PIMAN SH COME TER JOIN USH OTHER HASH-BEENSH ON SHKID ROW! GOT MY METHSH, PAL?
WHUMP
PIMAN ON THE HEAP WITH FROGGER E.T., PACMAN AND KONG? UP THERE SOMEWHERE? SOMEBODY DO SOMETHING"